DEPARTMENT OF THE INTERIOR,

CENSUS OFFICE.

ROBERT P. PORTER,
Superintendent.
Appointed April 20, 1889; resigned July 31, 1893.

CARROLL D. WRIGHT,
Commissioner of Labor in charge.
Appointed October 5, 1893.

REPORT

ON

MANUFACTURING INDUSTRIES

IN

THE UNITED STATES

AT THE

ELEVENTH CENSUS: 1890.

PART III.

SELECTED INDUSTRIES.

WASHINGTON, D. C.:
GOVERNMENT PRINTING OFFICE.
1895.

CONTENTS—PART III.

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE,
WASHINGTON, D. C., November 6, 1894.

SIR:

I have the honor to transmit herewith the Report on Manufactures, Part III, consisting of special reports on selected industries. The preparation of the schedules of inquiry and the collection of the data were conducted under the immediate supervision of Mr. Frank R. Williams, late expert special agent, who had charge of similar work at the Tenth Census, and Mr. George S. Boudinot, late chief of the division of manufactures. The tabulation of the data and the preparation of the statistical tables and such of the reports as are not credited to special agents, whose names immediately precede the respective reports, have been prepared by or under the direction of Mr. William M. Steuart, chief of the division of manufactures.

I am, very respectfully, your obedient servant,

CARROLL D. WRIGHT,
Commissioner of Labor in charge.

Hon. HOKE SMITH,
Secretary of the Interior.

TEXTILES.

COMBINED TEXTILES.
WOOL MANUFACTURE.
COTTON MANUFACTURE.
SILK MANUFACTURE.
DYEING AND FINISHING TEXTILES.

PRINCIPAL TEXTILE INDUSTRIES IN THE UNITED STATES.

BY S. N. D. NORTH.

The manufactures of wool, cotton, and silk are so closely allied to each other by general similarity of processes and machinery, and by the increasing interchangeable use of the fibers, that they may properly be regarded as constituting one general manufacture, to be considered not only separately, but also as a whole.

For the latter purpose tabulated statements containing the principal facts obtained at the Eleventh Census relating to these industries are herewith presented. Statements in detail for each principal branch of the industry will be found immediately following. For the purpose indicated it is necessary to include with the statistics of wool, cotton, and silk manufactures those of a closely allied industry, viz, the dyeing and finishing of textiles. The latter relates to the operations of independent dye works, bleacheries, and print works which are exclusively employed in finishing the products of woolen, cotton, and silk mills. The value of the product reported is simply the value added to the fabric by these final processes when conducted by distinct establishments. The other textile industries, the hemp, jute, and flax manufactures, and "mills employed in working raw cotton, waste, or cotton yarn into hose, webbing, tapes, fancy fabrics, mixed goods, or other fabrics, which are not sold as specific manufactures of cotton or wool", reported as "Special mills" in 1880, were treated at the census of 1890 with less particularity of detail upon the general manufacturing schedule, and the results will appear in the reports containing general statistics of manufactures under different heads, the most important of which are awnings, tents, and sails; baggings, flax, hemp, and jute; bags, other than paper; belting and hose, linen; belting and hose, rubber; carpets, rag; cordage and twine; cotton waste; gloves and mittens; hand knit goods; jute and jute goods; linen goods; rubber and elastic goods; thread, linen; upholstery materials.

As a preliminary exhibit of the growth of the textile industry of the United States, a table is first presented, covering the main statistics for a period of forty years as reported at the censuses of 1850, 1860, 1870, 1880, and 1890. This table shows the total number of establishments engaged in each of the textile manufactures and in dyeing and finishing, the amount of capital, number of employés, amount of wages, cost of materials, and value of manufactured products.

TABLE 1.—COMPARATIVE STATEMENT OF COMBINED TEXTILE INDUSTRIES IN THE UNITED STATES: 1850-1890.

INDUSTRIES.	Year.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.		Cost of materials used.	Value of products.
				Employés.	Wages.		
Combined textiles	1850	3,025	$112,513,947	146,897	(a)	$76,715,959	$128,769,971
Wool manufacture (b)	1850	1,760	32,516,366	47,763	(a)	29,246,696	49,636,881
Cotton manufacture	1850	1,094	74,500,931	92,286	(a)	34,835,056	61,869,184
Silk manufacture	1850	67	678,300	1,743	(a)	1,093,860	1,809,476
Dyeing and finishing textiles	1850	104	4,818,350	5,105	(a)	11,540,347	15,454,430
Combined textiles	1860	3,027	150,080,852	194,082	$40,353,462	112,842,111	214,740,614
Wool manufacture (b)	1860	1,073	42,849,932	59,522	13,361,602	46,049,365	80,734,606
Cotton manufacture	1860	1,091	98,585,260	122,028	23,940,108	57,285,534	115,681,774
Silk manufacture	1860	139	2,926,980	5,435	1,050,224	3,901,777	6,607,771
Dyeing and finishing textiles	1860	124	5,718,671	7,097	2,001,528	5,005,435	11,716,463
Combined textiles	1870	4,790	297,694,245	274,942	86,565,191	353,249,102	520,386,764
Wool manufacture (b)	1870	3,456	132,382,319	119,859	40,357,235	134,154,615	217,668,826
Cotton manufacture	1870	956	140,706,291	135,069	39,044,132	111,736,936	177,489,739
Silk manufacture	1870	86	6,231,130	6,649	1,942,286	7,817,550	12,210,662
Dyeing and finishing textiles	1870	292	18,374,503	13,066	5,221,538	c99,539,902	c113,017,537

a This item was not fully reported at the census of 1850.
b Includes hosiery and knit goods.
c At the census of 1870 the value of the fabric itself was included, whereas at all subsequent censuses merely the values added to such fabrics by the processes of dyeing and finishing are given.

TABLE 1.—COMPARATIVE STATEMENT OF COMBINED TEXTILE INDUSTRIES IN THE UNITED STATES: 1850–1890—Cont'd.

INDUSTRIES.	Year.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.		Cost of materials used.	Value of products.
				Employés.	Wages.		
Combined textiles	1880	4,018	$412,721,496	384,251	$105,050,666	$302,709,894	$532,673,488
Wool manufacture (a)	1880	2,689	159,091,869	101,557	47,389,087	164,371,551	267,252,913
Cotton manufacture (b)	1880	756	208,280,346	c174,659	42,040,510	102,206,347	192,090,110
Silk manufacture	1880	382	19,125,300	31,337	9,146,705	22,467,701	41,033,045
Dyeing and finishing textiles	1880	191	26,223,981	16,698	6,474,364	13,664,295	32,297,420
Combined textiles	1890	4,114	d739,973,661	511,897	175,547,343	421,398,196	721,949,262
Wool manufacture (a)	1890	2,489	296,494,481	219,132	76,660,742	203,095,572	337,768,524
Cotton manufacture	1890	905	354,020,843	221,585	69,489,272	154,912,979	267,981,724
Silk manufacture	1890	472	51,007,597	50,913	19,680,318	51,004,425	87,298,454
Dyeing and finishing textiles	1890	248	38,450,800	20,267	9,717,011	12,385,220	28,900,560

a Includes hosiery and knit goods.

b In addition to these data there were received at the census of 1880 returns for 240 mills classed as "Special mills", engaged in working raw cotton, waste, or cotton yarn into hosiery, webbing, tapes, and fancy fabrics, and mixed goods or other fabrics which are not sold as specific manufactures of cotton or wool. These 240 establishments reported $11,224,448 capital, 12,928 employés, $3,573,909 wages, $2,338,385 cost of cotton consumed, $18,860,273 value of products, and should be considered in making comparisons. In 1890 this class of mills is reported under a number of different heads, enumerated on page 3, although some of them may be included in the totals for the textile industries presented in this report.

c Includes 2,115 officers and clerks, whose salaries were not reported.

d Value of property hired is not included in the capital reported in 1890 because it was not included in the reports of previous census years.

While the incomplete character of earlier census inquiries renders their comparison with the more detailed results of later investigations somewhat misleading, still the general results shown in the foregoing table present a picture of wonderful development. Since 1850 the capital employed in the textile industry has increased nearly seven times, and the value of products nearly six times. The number of employés has increased from 146,897 to 511,897. The amount paid in wages was not fully reported in 1850, but the increase from 1860 has been nearly four and a half times.

VALUE OF PRODUCTS.

The development of the textile industry has been uninterrupted. The combined industry produced in 1890 goods valued at $721,949,262, the largest percentage of increase, as measured by the value of products, occurring during the decade 1860–1870. But in order to correctly obtain the statistical measure of this growth, account must be taken of the fact that the value of product reported in 1870 was a currency value at a time when the paper dollar averaged 79.81 cents in gold, and the prices of all raw materials were correspondingly high. In making comparisons with the data for the census of 1870 this fact must be remembered, and all values reported at that census reduced to a gold basis. Another fact having a like bearing upon the true measure of growth is the steady decline in the market value of products which has been in progress since the census of 1870 was taken. This decline has been accelerated in each branch of textile manufacture by remarkable improvements and advances in labor saving machinery—improvements which partially equalize the advance in wages which has taken place. These mechanical improvements have not radically changed the principles of mechanism employed in the United States during the last thirty years, but they have greatly simplified and expedited processes, and reduced the labor required to produce a given amount of product. The percentages of increase in number of employés and value of products, after reducing to a gold basis the currency value reported for 1870, are as follows:

PERCENTAGES OF INCREASE IN AVERAGE NUMBER OF EMPLOYÉS AND VALUE OF PRODUCTS.

PERIODS.	Employés.	Products.
1850 to 1890	248.47	460.65
1850 to 1860	32.12	66.76
1860 to 1870	41.66	93.41
1870 to 1880	39.76	28.26
1880 to 1890	33.22	35.53

The differences between the percentages of increase in the value of products and in the number of employés indicate in a measure the increase in efficiency of machinery, although many different elements affect both percentages.

THE GROWTH BETWEEN 1880 AND 1890.

The statistics relating to the years 1880 and 1890 contained in the preceding tables are shown in Table 2 in direct comparison by totals for each state, and for geographical groups of states.

TABLE 2.—COMPARATIVE STATEMENT OF COMBINED TEXTILE INDUSTRIES IN THE UNITED STATES, BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1890 AND 1880.

STATES AND TERRITORIES.	Year.	Number of establishments.	Capital. (a)	Miscellaneous expenses. (b)	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.		Cost of materials used.	Value of products.
					Employés.	Wages.		
United states	1890	4,114	$739,973,661	$43,356,736	511,397	$175,547,343	$421,398,196	$721,949,262
	1880	4,018	412,721,496	.....	c384,251	105,050,666	302,709,894	532,673,488
New England states	1890	1,210	426,365,388	24,501,029	259,542	91,888,951	211,074,959	365,613,324
	1880	1,214	261,561,147	.....	217,674	60,611,202	172,223,778	310,542,352
Maine	1890	107	30,990,097	1,807,550	20,011	6,579,880	14,495,290	24,911,165
	1880	126	10,932,406	.....	15,869	4,204,778	12,148,526	21,470,567
New Hampshire	1890	118	43,891,412	2,339,287	29,573	10,044,132	22,225,159	37,256,364
	1880	126	31,247,024	.....	24,743	6,904,069	18,809,037	32,757,353
Vermont	1890	45	5,491,253	301,466	3,040	1,116,026	2,626,232	4,744,320
	1880	58	3,750,257	.....	3,204	807,048	2,881,935	4,071,041
Massachusetts	1890	533	215,254,813	12,930,047	126,819	45,590,267	107,465,624	184,938,074
	1880	496	120,443,376	.....	106,743	29,801,616	84,228,717	152,088,522
Rhode Island	1890	204	70,699,470	4,260,785	48,071	16,835,284	37,911,493	67,005,615
	1880	194	46,989,447	.....	36,622	10,127,287	27,708,640	51,383,569
Connecticut	1890	203	60,038,346	2,801,894	32,028	11,723,422	27,251,161	46,757,780
	1880	214	39,198,637	.....	30,493	8,706,404	26,446,914	47,271,300
Middle states	1890	1,914	222,402,855	14,352,458	185,136	67,512,602	161,124,539	279,576,396
	1880	1,540	115,483,359	.....	132,884	38,013,381	106,328,536	183,443,725
New York	1890	615	75,881,672	4,840,584	62,383	22,663,753	47,621,495	86,171,203
	1880	480	42,022,987	.....	45,153	12,652,423	30,610,901	56,191,417
New Jersey	1890	240	43,321,016	2,952,104	34,712	13,704,395	29,682,210	52,831,023
	1880	186	16,028,770	.....	24,111	7,052,833	17,456,679	31,805,318
Pennsylvania	1890	1,010	92,666,227	6,052,430	81,381	29,230,630	78,860,158	132,367,499
	1880	822	51,238,747	.....	58,005	16,560,274	53,909,540	88,594,143
Delaware	1890	11	2,555,233	122,690	1,543	546,117	1,007,270	1,821,278
	1880	13	1,227,129	.....	1,058	301,231	975,490	1,536,260
Maryland (d)	1890	38	7,958,707	384,650	5,117	1,361,707	3,944,406	6,385,303
	1880	39	4,965,726	.....	4,557	846,020	3,285,917	5,256,557
Southern states	1890	486	62,623,729	2,691,426	44,768	9,771,056	32,624,416	49,729,674
	1880	613	20,413,414	.....	19,409	3,254,936	12,781,692	20,381,689
Virginia	1890	47	4,089,511	177,750	2,950	628,159	1,998,555	2,904,171
	1880	56	1,646,850	.....	1,477	241,509	1,023,471	1,618,930
North Carolina	1890	124	11,195,122	442,056	9,276	1,747,729	6,553,635	10,053,264
	1880	98	3,058,900	.....	3,528	462,854	1,719,352	2,857,642
South Carolina	1890	35	11,144,233	528,236	8,193	1,646,689	6,820,132	9,801,956
	1880	25	2,784,000	.....	2,066	382,017	1,827,755	2,919,844
Georgia	1890	71	18,084,708	746,314	11,058	2,470,438	7,998,126	12,375,724
	1880	73	6,532,390	.....	6,496	1,161,654	4,185,462	6,724,784
Florida	e1890	.....	.....	.....	.....	.....	.....	.....
	1880	1	11,000	.....	33	5,000	18,005	25,000
Alabama	1890	22	2,965,713	158,734	2,565	515,136	1,573,988	2,308,646
	1880	30	1,275,400	.....	1,508	243,035	833,072	1,201,764
Mississippi	1890	16	3,007,198	75,676	2,266	597,251	1,389,009	2,257,583
	1880	16	1,453,640	.....	940	186,314	548,795	978,098
Louisiana	1890	6	1,516,660	15,650	1,253	290,042	737,212	1,126,751
	1880	2	195,000	.....	108	12,572	72,470	86,776
West Virginia	1890	33	408,881	27,708	328	79,380	225,961	395,700
	1880	57	328,170	.....	305	51,361	290,343	413,586
Kentucky	1890	49	4,142,815	246,643	2,876	804,094	2,303,959	3,785,436
	1880	103	1,255,750	.....	1,181	231,755	1,107,523	1,689,694
Tennessee	1890	69	4,322,336	230,116	3,172	735,095	2,525,198	3,724,138
	1880	122	1,564,264	.....	1,446	228,134	976,815	1,495,441
Arkansas	1890	8	104,236	8,775	115	21,106	46,557	71,913
	1880	27	160,550	.....	154	20,565	119,277	177,430
Texas	e1890	.....	.....	.....	.....	.....	.....	.....
	1880	3	147,500	.....	107	28,166	59,262	102,100
All other southern states (e)	1890	6	982,316	33,762	716	235,937	463,334	774,392

a Value of hired property is not included in the capital reported in 1890, because it was not included in the report of 1880.

b This item was not reported at the census of 1880.

c Includes 2,115 officers and clerks engaged in cotton manufacture whose salaries were not reported.

d Maryland is classed as a middle state for purposes of comparison.

e Includes states grouped in order that the operations of individual establishments may not be disclosed. These establishments are distributed as follows: Florida, 1; Texas, 5.

TABLE 2.—COMPARATIVE STATEMENT OF COMBINED TEXTILE INDUSTRIES IN THE UNITED STATES, BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1890 AND 1880—Continued.

STATES AND TERRITORIES.	Year.	Number of establishments.	Capital.	Miscellaneous expenses.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.		Cost of materials used.	Value of products.
					Employés.	Wages.		
Western states	1890	504	$28,581,689	$1,811,829	22,451	$6,374,734	$15,674,282	$27,029,868
	1880	651	15,263,576		14,284	3,171,147	11,375,888	18,305,722
Ohio	1890	125	4,820,526	314,894	3,970	1,130,518	3,233,787	5,437,483
	1880	163	2,323,340		2,839	511,923	1,780,099	3,032,069
Indiana	1890	61	5,431,065	379,881	4,434	1,150,063	3,208,276	5,214,211
	1880	95	3,413,105		2,784	662,310	2,587,954	4,074,576
Illinois	1890	75	4,119,495	234,455	4,072	1,315,335	2,429,564	4,666,115
	1880	85	1,825,203		2,337	555,209	1,937,336	2,980,110
Michigan	1890	44	1,691,461	119,060	1,635	430,906	1,110,018	1,964,674
	1880	51	726,189		1,397	185,364	624,241	928,766
Wisconsin	1890	60	4,603,613	279,328	3,881	952,933	2,399,217	4,100,201
	1880	53	1,559,964		1,146	285,566	1,096,474	1,827,275
Minnesota	1890	25	815,144	70,017	475	170,703	398,300	730,458
	1880	15	203,500		203	55,327	190,807	303,378
Iowa	1890	20	896,741	53,060	539	181,640	620,832	899,918
	1880	37	555,700		505	118,252	437,301	682,812
Missouri(a)	1890	45	896,020	38,608	804	204,267	452,068	798,736
	1880	109	1,605,550		1,350	235,107	1,105,497	1,563,641
Kansas	b1890							
	1880	6	141,425		126	26,675	107,401	212,065
Utah	1890	14	612,579	29,301	344	121,176	189,339	392,094
	1880	12	402,000		306	70,208	150,698	287,331
Washington	b1890							
	1880	1	40,000		29	4,000	52,000	70,000
Oregon	1890	6	1,350,585	86,906	402	175,313	327,502	614,932
	1880	10	566,800		216	86,088	227,486	549,030
California	1890	20	3,235,263	199,373	1,794	516,590	1,238,067	2,080,215
	1880	14	1,840,800		986	375,718	1,078,534	1,794,033
All other western states (b)	1890	9	109,197	6,037	98	25,200	58,312	130,531

a Missouri is classed as a western state for the purpose of comparison.

b Includes states having less than 3 establishments in order that the operations of individual establishments may not be disclosed. These establishments are distributed as follows: Colorado, 2; Idaho, 1; Kansas, 2; Nebraska, 1; South Dakota, 2; Washington, 1.

The foregoing table brings out in strong light the concentration of the textile interests in the New England and middle states, where were produced in 1890 $645,189,720, or 89.37 per cent of the total value of textile products in the United States, being an increase of 30.61 per cent over the production of these states in 1880. The New England states alone produced 50.64 per cent of the total product of the United States, an increase of 17.73 per cent over the value of their textile products in 1880. The middle states produced 38.73 per cent of the total product, an increase of 52.40 per cent over 1880. The increase in the textile products of the states included in the southern group has been more marked than in those included in the western, due to the notable increase in cotton manufacture. The southern states produced textiles to the value of $49,729,674 in 1890, being 6.89 per cent of the total value of textiles, an increase of 143.99 per cent over the value of their production in 1880. This increase is almost entirely in the manufacture of cotton, as the product of the wool, hosiery, silk, and dyeing and finishing industries in the south reported at the census of 1890 amounted only to $8,215,963.

The product of the textile industry for the western states, as reported at the census of 1890, is but $27,029,868 or 3.74 per cent of the total product of the country, though an increase of 47.66 per cent over the value of the product of the western states in 1880. This increase was chiefly in the manufacture of woolen and hosiery and knit goods, the product of other textile industries in the western states having a total value of $8,053,696 in 1890.

The state of Massachusetts is still the leading textile manufacturing state of the Union, manufacturing in 1890 a product valued at $184,938,074, of which $100,202,882 or 54.18 per cent was the value of cotton goods. The value of Massachusetts textile products in 1890 was 25.62 per cent of the production of the entire country, the gain during the decade being 20.88 per cent.

Pennsylvania ranks second as a textile producing state, manufacturing goods to the value of $132,367,499 in 1890, which is 18.33 per cent of the total product of the country, and an increase of 49.41 per cent over her product of 1880.

The northern state which shows the largest percentage of increase in product during the decade is New Jersey, where an increase of 65.79 per cent is shown. After New Jersey, New York shows the largest percentage of increase, 53.35, followed by Pennsylvania with 49.41 and Rhode Island with 30.40 per cent.

Of the southern group, the state of Georgia ranks first in total value of product, with an increase of 84.03 per cent, followed by North Carolina with an increase of 251.80 per cent, South Carolina with an increase of 235.70 per cent, and Kentucky with an increase of 124.03 per cent. As previously stated, the great increase in this section is due principally to the development of the cotton industry during the past decade.

It is to be noted that the states in which any single branch of the textile industry is successful are those in which each of the others chiefly flourish. The development of the cotton manufacture in the south is the only conspicuous exception to this rule. The rule may be tested by observing that the limited number of states in which the silk manufacture has a large development are states in which the cotton and wool manufactures are increasingly and successfully carried on. Nevertheless the tendency to localization, which is strong in each textile industry, has resulted in making four cities in different states the chief localities in which each industry is carried on: Philadelphia, Pa., in the wool manufacture; Fall River, Mass., in the cotton manufacture; Paterson, N. J., in the silk manufacture, and Cohoes, N. Y., in the hosiery and knit goods manufacture.

Table 3 presents the percentages of increase in the combined industries, as shown by the census reports of 1880 and 1890. The more thorough method employed at the current census may have in a measure affected the increase shown in some of the items, especially that of capital.

TABLE 3.—COMPARATIVE STATEMENT AND PERCENTAGE OF INCREASE FOR TEXTILE INDUSTRIES: 1890 AND 1880.

GENERAL HEADS.	1890	1880	Percentage of increase.
Number of establishments	4,114	4,018	2.39
Capital (*a*)	$739,973,061	$412,721,496	79.29
Miscellaneous expenses	$43,356,736	(*b*)	.....
Average number of employés	511,897	c384,251	33.22
Total wages	$172,082,609	$105,050,666	63.81
Cost of materials used	$421,398,196	$302,709,894	39.21
Value of products	$721,949,262	$532,673,488	35.53

a Value of hired property is not included in the capital reported in 1890, because it was not included in the report of 1880.

b This item was not reported at the census of 1880.

c Includes 2,115 officers and clerks engaged in cotton manufacture whose salaries were not reported. Therefore, in computing the percentage of increase in wages, the amount, $3,464,734, paid these classes in the cotton industry in 1890 is not included.

In the value of their products the wool and cotton manufactures rank very closely. At the census of 1890 the value of the product of the wool manufacture is shown to be $337,768,524, and of cotton manufacture as $267,981,724, but all cotton knit goods and hosiery are included with the former, as well as cotton goods manufactured in woolen mills. If it were possible to make an exact classification of the products along the line of the predominating fiber, we should find the value of the products of these two industries about the same. Moreover, mixed textiles, so called, made of wool and cotton, are all enumerated with the wool manufacture in accordance with the rule which classifies them with the products of the fiber predominating in value. In all the following comparisons between the two industries the statistics of hosiery and knit goods manufacture are omitted from the totals of wool manufacture for the reason above given.

Up to 1870 the value of the cotton manufactures greatly exceeded that of wool manufactures, as shown by the following table:

TABLE 4.—COMPARATIVE VALUE OF TEXTILE PRODUCTS FROM 1800 TO 1890.

YEARS.	Wool.	Cotton.	Silk.
1800	.....	$170,000	.....
1810	.....	3,240,000	.....
1820	$4,413,068	25,000,000	.....
1830	14,528,166	27,000,000	.....
1840	20,696,099	46,350,453	.....
1850	48,608,779	61,869,184	$1,809,476
1860	73,454,000	115,681,774	6,607,771
1870	199,257,262	177,489,739	12,210,662
1880	238,085,686	192,060,110	41,033,045
1890	270,527,511	267,981,724	87,298,454

In the foregoing table the estimates of the special agents on the cotton and wool manufactures, for the value of product at the census years prior to 1840, are used in the absence of complete official data for those years.

The reversal of relations in the value of the products of the wool and cotton manufactures which occurred between 1860 and 1870 was the direct result of conditions created by the war, as the cotton famine, the demand for woolen goods for the army, and the large development of the domestic wool clip. In the interval since 1860 the fall in the value of wool has been much greater relatively than the fall in the value of cotton, and this factor has had a great influence in bringing the relative values of the manufactured product nearer together.

COMPARATIVE CONSUMPTION OF FIBERS.

The relative value of products is not a true measure of the consumption, which can only be judged by the quantity of raw material used in the mills. The volume of cotton products entering into popular consumption is much the greater. This is shown by the following comparative table, which gives the annual consumption in quantities of raw cotton and wool, and so far as possible for silk by decades for fifty years.

TABLE 5.—COMPARATIVE STATEMENT OF CONSUMPTION OF TEXTILE FIBERS: 1840-1890.

YEARS.	Wool.	Cotton.	Silk.
	Pounds.	*Pounds.*	*Pounds.*
1840	.....	126,000,000	.....
1850	70,862,829	288,558,000	.....
1860	95,452,159	422,704,975	462,965
1870	214,373,219	398,308,257	684,488
1880	287,597,334	750,343,981	2,690,482
1890	351,158,020	1,117,945,776	6,376,881

If to the cotton consumed in 1890, as given above, we add the 75,428,865 pounds of cotton consumed by the woolen industry, including hosiery and knitting mills, and to the wool consumed we add the 21,639,393 pounds of wool consumed in hosiery and knitting mills, we have a total of 1,193,374,641 pounds of cotton used by domestic manufactures in the census year, as compared with a total of 372,797,413 pounds of wool, or 3.20 pounds of cotton to each pound of wool. A large quantity of hair and shoddy is consumed in wool manufacture, and the quantity of wool consumed is reported "in condition purchased" with an average shrinkage of 50 per cent. while the cotton consumed shrinks but little beyond the wastage.

NUMBER OF ESTABLISHMENTS.

The smallest percentage of increase shown in Table 3 is in the number of establishments reporting. This column strikingly illustrates the tendency apparent in the textile industries toward the concentration of manufacture in large establishments. This tendency is chiefly between 1880 and 1890 in the wool manufacture, where the number of establishments reporting in 1890 is less than in 1880. The special reasons for this are fully set forth in the report on wool manufactures. The remaining branches of the textiles each show a substantial increase in the number of establishments, but the percentage of gain is much smaller in this particular than in the other items. Neither the cotton nor the silk statistics have ever been complicated by statistics of the household industry in the manner that is still true of the woolen manufacture; but a reference to Table 1 shows that the number of establishments now engaged in manufacturing cotton is smaller than in 1850–1860, although their spindle capacity is now nearly four times as great as in 1850. The number of silk mills, on the other hand, has steadily increased, except for the decade ending in 1870.

The widest contrasts are presented by the organization of the cotton and wool industries. The cotton manufacture, conducted as a rule under the corporate method, is carried on in large mills, comparatively few in number, the 905 establishments reported at 1890 manufacturing a product nearly equal in value to the product of the 1,693 wool manufacturing establishments. There are comparatively few very large mills engaged in manufacturing wool fabrics.

CAPITAL.

The figures given under the head of capital must be used with caution, as the method of reporting this item has varied with every census, and has never before resulted in a return so complete and comprehensive as that presented for 1890. With this caution, we present a table showing the capital in each of the textile industries for each decade since 1840.

TABLE 6.—CAPITAL IN THE TEXTILE INDUSTRIES FROM 1840 TO 1890.

YEARS.	Wool.	Hosiery and knit goods.	Cotton.	Silk.
1840	$15,765,124	(a)	$51,102,359	.....
1850	31,971,631	$544,735	74,500,931	$678,300
1860	38,814,422	4,035,510	98,585,269	2,926,980
1870	121,451,059	10,931,260	140,706,291	6,231,130
1880	143,512,278	15,579,591	208,280,346	19,125,300
1890 (b)	245,886,743	50,607,738	354,020,843	51,007,537

a Not separately reported.

b Value of hired property is not included in the capital reported in 1890, because it was not included in the reports of previous census years.

The relationship between capital and the value of the product varies in accordance with the character of the material used. The silk manufacture, utilizing the most costly and delicate of the fibers, produces much the largest value of product relatively with the amount of capital, and after silk the wool manufacture. The product of the latter is valued at $24,640,768 in excess of the capital utilized, while the capital in the cotton manufacture is $86,039,119 in excess of the value of the product. This general relationship between capital and product in each of the textile industries has existed since 1850, as shown by Table 1, although the given amount of capital in each industry produced a much larger product relatively in the earlier decades than at present.

RELATIONSHIP BETWEEN MATERIALS AND PRODUCT.

The relationship between the cost of materials and the value of the product exhibits a striking uniformity in all the textile industries. This is shown by the following table, which gives the cost of materials in $100 of product for 1890 in each industry:

TABLE 7.—COST OF MATERIALS USED AND VALUE OF PRODUCTS.

INDUSTRIES.	Cost of materials used.	Value of products.	Cost of materials in $100 of product.
Wool	$167,233,987	$270,527,511	$61.82
Hosiery and knit goods	35,861,585	67,241,013	53.33
Cotton	154,912,979	267,981,724	57.81
Silk	51,004,425	87,298,454	58.43

COMPARISON OF EMPLOYÉS AND WAGES.

Table 8 presents the average number of employés and amount of wages in each branch of the textile industry, together with the total wages and the average annual earnings of males, females, and children, for each class in 1890.

TABLE 8.—AVERAGE NUMBER OF EMPLOYÉS, TOTAL WAGES, AND AVERAGE ANNUAL EARNINGS FOR THE UNITED STATES: 1890.

INDUSTRIES	AGGREGATES.			OFFICERS, FIRM MEMBERS, AND CLERKS.					
				Males above 16 years.			Females above 15 years.		
	Average number.	Total wages.	Average annual earnings per employé.	Average number.	Total wages.	Average annual earnings per employé.	Average number.	Total wages.	Average annual earnings per employé.
Combined textiles	511,897	$175,547,343	$342.93	9,709	$11,724,072	$1,207.55	470	$206,678	$439.74
Wool	157,923	58,397,470	369.78	3,530	4,011,337	1,136.36	122	46,358	379.98
Hosiery and knit goods	61,209	18,263,272	298.38	1,520	1,641,280	1,079.76	101	43,923	434.88
Cotton	221,585	69,489,272	313.60	2,627	3,427,362	1,304.67	82	37,372	455.76
Silk	50,913	19,680,318	386.55	1,396	1,852,235	1,326.82	135	65,642	486.24
Dyeing and finishing	20,267	9,717,011	479.45	636	791,908	1,245.14	30	13,383	446.10

INDUSTRIES.	ALL OTHER EMPLOYÉS.								
	Males above 16 years.			Females above 15 years.			Children.		
	Average number.	Total wages.	Average annual earnings per employé.	Average number.	Total wages.	Average annual earnings per employé.	Average number.	Total wages.	Average annual earnings per employé.
Combined textiles	216,345	$91,038,323	$420.80	243,589	$66,644,785	$273.60	41,784	$5,933,485	$142.00
Wool	78,550	33,702,231	429.05	64,944	18,883,174	290.76	10,777	1,754,376	162.79
Hosiery and knit goods	14,846	6,041,200	406.92	40,826	10,006,070	245.09	3,916	530,849	135.56
Cotton	88,837	33,797,517	380.44	106,607	29,165,086	273.58	23,432	3,061,935	130.67
Silk	17,602	9,349,531	531.16	28,914	7,970,065	275.65	2,866	442,845	154.52
Dyeing and finishing	16,510	8,147,844	493.51	2,298	620,390	269.97	793	143,486	180.94

The amount paid in wages to all classes of employés in the combined textile industries has increased 63.81 per cent since 1880. In making this calculation the amount paid officers and clerks in cotton mills is not included in the total amount of wages for 1890, as it was not reported at the census of 1880. The largest increase occurred in the hosiery and knit goods industry where it was shown to be 172.53 per cent. Silk follows, with an increase of 115.16 per cent; then cotton, with an increase of 57.05 per cent; dyeing and finishing, with an increase of 50.08 per cent, and finally wool, with an increase of 43.53 per cent. The increase in wages and average annual earnings for each employé, as in other items, may be due in part to the change in the form of inquiry and the more perfect enumeration at the census of 1890. The large decrease in the number of children employed also has considerable bearing on the increase in the average annual earnings.

The average annual earnings for all classes of employés differ widely in the several industries. For the division of the average annual earnings between men, women, and children, and the manner in which the average is affected by the relative number of each class and the time employed, reference is made to the tables presenting the data in detail for wool, cotton, and silk manufacture.

The cotton manufacture employs the largest number of operatives, but the wool manufacture employs the largest proportion of men. The following table shows the number of men, women, and children, and their relative proportion in each industry for 1880 and 1890:

TABLE 9.—AVERAGE NUMBER OF MALES, FEMALES, AND CHILDREN IN EACH INDUSTRY, WITH THE PERCENTAGE THAT EACH IS OF THE TOTAL NUMBER OF EMPLOYÉS: 1880 AND 1890.

INDUSTRIES.	MALES ABOVE 16 YEARS.				FEMALES ABOVE 15 YEARS.				CHILDREN.			
	1880		1890		1880		1890		1880		1890	
	Average number.	Percentage.	Average number.	Percentage.	Average number.	Percentage.	Average number.	Percentage.	Average number.	Percentage.	Average number.	Percentage.
Combined textiles	159,382	41.48	226,054	44.16	169,806	44.19	244,059	47.68	55,063	14.33	41,784	8.16
Wool	67,942	51.21	82,080	51.98	49,107	37.01	65,066	41.20	15,623	11.78	10,777	6.82
Hosiery and knit goods	7,517	26.02	16,366	26.74	17,707	61.30	40,927	66.86	3,661	12.68	3,916	6.40
Cotton	61,760	35.36	91,464	41.28	84,558	48.41	106,680	48.15	28,341	16.23	23,432	10.57
Silk	9,375	20.92	18,998	37.31	16,396	52.32	29,049	57.06	5,566	17.76	2,866	5.63
Dyeing and finishing textiles	12,788	76.58	17,146	84.60	2,038	12.21	2,328	11.49	1,872	11.21	793	3.91

It is evident from the tables here presented that the textile industries have flourished in keeping with the general prosperity of the country. The natural aptitude of our people fits them for equal success in any of these industries, and climatic conditions are, on the whole, as favorable here as elsewhere. In every branch of textiles our national contributions to the development and perfecting of the special machinery employed in the manufacture have been of the utmost importance.

The manufacture of linen has never been largely carried on in the United States, although we have several large mills which have been successfully operated for many years. This is explained by the inferior character of our domestic flax as compared with that of Belgium and Ireland, by the excessive amount of care and labor required in the preparation of the fiber for spinning, and by the comparatively limited market for linen goods, which diminishes the inducement to enter into competition with countries where the manufacture of these goods has been made a specialty for generations, and in which it has reached a high degree of excellence.

Contrasting the general conditions of the textile industries of this country with its conditions elsewhere, one is impressed with the great diversification which attends it here and with the remarkable manner in which it adapts its products to the daily needs of our own people. Manufacturing almost wholly for domestic consumption, the aim in all lines has been to anticipate and meet the average wants of the home community. This tendency has resulted in the development of the manufacture of the cheaper and coarser fabrics of all fibers, and a comparatively small advance in the higher and more expensive products. There are notable exceptions to this rule in every branch, particularly carpets; and the one characteristic of the progress of the last decade, which distinguishes it beyond the limits of statistical comparison from the progress of any previous decade, has been the advance made into the higher forms of the textile arts. This advance has occurred in all branches, and is dwelt upon in detail in the special reports which follow.

WOOL MANUFACTURE.

BY S. N. D. NORTH.

The Eleventh Census completes the statistical record of the first century of woolen manufacture in the United States by the factory system, as now understood and developed. The statistical history of the industry for the first half of the century is meager and desultory. For the fifty years last past, it has been presented by the several censuses with a detail which makes it possible to accompany the present report with a comparative summary of all the statistical data regarding American wool manufacture and the hosiery and knit goods manufacture which have appeared in the federal censuses since 1840. The data presented in census records prior to 1840 are so fragmentary that it is impossible to reduce them to tabular form in harmony with the later statistics. The preparation of the tables for the fifty years they cover has been accompanied by many difficulties, owing to the different methods of grouping adopted and the conflicting character of the figures that are published. To illustrate these difficulties, it may be stated that at times the hosiery and knit goods manufacture has been counted as a part of the wool manufacture, and at other times it has been separately enumerated, and not subsequently incorporated. Carding mills are partially included in the census of 1870 and subsequently, but not always prior to that date. The utmost pains have been taken in constructing these tables to bring together all the figures that properly belong in them. The figures for woolen goods, worsted goods, carpets, felts, wool hats, and hosiery and knit goods are combined, whenever obtainable. Where deficiencies exist which can not be supplied attention is called to them in the footnotes attached.

The chief difficulty in the compilation of the scattered returns contained in previous censuses has arisen from the failure to include the statistics of hosiery and knit goods manufacture. The increasing use of cotton in this industry furnishes a reason why it should be separately treated, as in this table; but the total wool consumption can only be correctly stated by including these statistics with those of the other branches of the industry. While the quantity of cotton consumed in this industry now vastly exceeds that of wool, yet the value of the wool remains the greatest, justifying the classification of the census. In all the references of this report, therefore, the statistics of hosiery and knit goods are included.

The confusion that has existed, in consequence of the failure of previous census reports to properly group all these figures, has led to many errors in attempts to measure the statistical growth of the American wool manufacture on the basis of census figures, errors due to the omission, in one year or another, of one or another of the separate groups of figures essential to a complete comparison.

The rate of progress for the decade covered by the Eleventh Census has not been as rapid as that which marked several of the previous decades covered by Tables 1 and 2, but it has been healthy and steady, as is shown by the following comparative table:

GENERAL HEADS.	1890	1880	Percentage of increase.
Number of establishments	*a* 2,489	2,089	*b* 7.44
Capital	*a* $296,494,481	$159,091,869	*c* 86.37
Miscellaneous expenses	$19,249,508	(*d*)	
Average number of employés	218,132	161,557	35.64
Total wages	$76,660,742	$47,389,087	61.77
Cost of materials used	$203,095,572	$164,371,551	23.56
Value of products	$337,768,524	$267,252,918	26.30

a Not including 267 idle establishments reporting invested capital amounting to $6,100,860. Does not include the value of "Hired property."

b Decrease.

c The great increase shown in the amount of capital employed as between 1890 and 1880 is more apparent than real, and is largely due to the fact that the capital returned for the census of 1880 did not take cognizance of all items which properly go to make up "live assets", and which, it is believed, are for the first time fully included in the census of 1890.

d This item was not reported at the census of 1880.

In this comparison we must bear in mind the fact that the year 1879–1880, in which the prior census was taken, was a year of unusual and at times even speculative activity in the wool manufacture, and it is commercially

recognized as the most prosperous year the industry has encountered since the war. On the other hand, the year 1889–1890 was a comparatively dull year in the wool manufacture, in which a considerable portion of the machinery of active mills was idle during a part or the whole of the year.

Another fact to be considered in making the comparison is the large reduction in the market value of the goods covered by this report. Probably no previous decade witnessed so general a downward movement in prices. The value of products now given indicates a much greater quantity of production than the same value in 1880 or in any previous year would have signified. Something of the measure of this decline in value of products is indicated by the fall in the cost of raw materials. The whole subject is discussed in another portion of this report.

No statement relating to mixed textiles will be made in the reports of the Eleventh Census similar to that embodied in Table VII, page 465, volume 2, of the Census of 1880. To avoid a possible misapprehension, it is necessary to state that a careful examination of the original data from which these statistics of "mixed textiles" were compiled for the Tenth Census, shows that so far as these products consisted of goods composed of wool and cotton, with wool the component material of chief value, they were a duplication of products already reported and accounted for in the statistics of the wool manufacture proper. For this reason no cognizance is to be taken of the products reported as "mixed textiles" in a comparison of the statistics of wool manufacture of the two census periods.

CONNECTICUT.

The reported value of the products of the wool manufacture of the state of Connecticut, as shown in Tables 1 and 2, is less by $4,011,764 than that reported in 1880, notwithstanding an increase in the machinery capacity of the state. The suspicion of inaccuracy excited by this fact led the special agent to make a careful comparison of his returns with those received by the Connecticut state bureau of statistics of labor. The comparison showed that the returns from the mills reporting to the state bureau were substantially the same as those made to the Census Office, thus confirming in a striking manner the accuracy of both. The decrease is partly due to the substitution of fur for wool in the hat manufacture, thus excluding the statistics of several mills from this report; but it also extends to the manufacture of woolen and worsted goods. An examination of individual returns made in 1880 leads the special agent to believe that the value of the products of Connecticut was exaggerated ten years ago.

MANUFACTURING IN PUBLIC INSTITUTIONS.

Various branches of the wool manufacture are carried on in the public, penal, and eleemosynary institutions of 9 states, all data of which are omitted from these tables. This manufacture consumed 76,300 pounds of wool and 210,000 pounds of cotton; but most of its products were made from purchased yarns, and consisted of hosiery and other knitted goods to the value of $403,137. The remaining products were chiefly flannels, linseys, and cotton-warp cloths. The other details regarding this phase of the manufacture are contained in the following table:

WOOL MANUFACTURE—STATEMENT OF PUBLIC, PENAL, AND ELEEMOSYNARY INSTITUTIONS.

STATES.	Number of institutions.	Employés.	Total wages.	Cost of materials used.	Value of products.
Total	14	1,419	$88,279	$279,800	$462,585
New York (a)	3	604	24,697	53,708	97,995
Pennsylvania (b)	3	432	36,060	132,181	196,306
All other states (c)	8	383	27,522	93,911	168,284

a Institutions in New York: hosiery and knit goods, 3.

b Institutions in Pennsylvania: hosiery and knit goods, 1; carpets, 2.

c Includes states having less than 3 institutions, so that the operations of individual institutions may not be disclosed. These institutions are located as follows: Maryland, 1, hosiery and knit goods; Minnesota, 1, hosiery and knit goods; New Hampshire, 1, hosiery and knit goods; Ohio 2, hosiery and knit goods; Texas, 1, woolen goods; Virginia, 1, hosiery and knit goods; Wisconsin, 1, hosiery and knit goods.

METHODS OF THE PRESENT INVESTIGATION.

In the preparation of the schedules for this inquiry pains were taken to avoid, so far as possible, any modifications that would prevent accurate comparisons with the statistics collected in 1880. The schedule of the last census was prepared by the late George William Bond, of Boston, and the data collected were compiled under his direction. Mr. Bond was recognized as the leading expert in the United States on all questions connected with wool and its manufacture. He had annually compiled since 1865 a review of the wool markets of the country, for the Boston Board of Trade, and his annual wool circulars contained the accepted data regarding the volume and movement of the clip. He was familiar also with the manufacture, and his schedule, the first special census schedule prepared for this industry, was based upon an intimate knowledge of the conditions of the industry, and of the information likely to be of service in connection with a statistical exhibit of its condition and progress. The present special agent accepted Mr. Bond's schedule after correspondence with manufacturers, except in two particulars. It was evident that the inquiry of 1880 had not resulted in a satisfactory return of the

capital invested, and for Mr. Bond's questions, under this head, were substituted those adopted by the Census Office for uniform use upon all the special schedules relating to manufactures. In the classification of products a new system was also adopted. In these two particulars no comparison of returns as between 1880 and 1890 can be safely attempted. In other respects it is believed that the comparison is exact and accurate. At the same time the statistics of the manufacture are now presented with a detail and closeness of analysis exceeding anything attempted in 1880. This is particularly the case in the wage tables and in the assignment of values to the different varieties of manufactured products.

NUMBER OF ESTABLISHMENTS.

The total number of establishments for which returns were received at the Eleventh Census was 2,770, of which number 267 were not in operation during the census year, and 14 were conducted by public, penal, and eleemosynary institutions. The number of establishments reported in 1880 was 2,689.

The number of establishments affords no clew to the growth or condition of the industry of wool manufacturing. This is due to the fact that in all censuses of the industry (except that of 1860) the custom carding mill has been counted as a woolen factory, although it is not, in the modern use of the term, a factory, and it ought therefore to be excluded from the statistics of factory manufacture. The present census has made such an elimination possible hereafter by a separate return of the statistics of custom carding mills.

CUSTOM CARDING MILLS.

These mills are simply neighborhood industries, similar in character to grist mills or the ginning mills of the cotton districts, that prepare the locality wool for the household spinner and weaver. Formerly they were scattered in great numbers all over the country, and were frequently combined with fulling mills, which finished the home-spun cloth for domestic use. Nearly every New England township had its carding and fulling mill, with machinery generally moved by water power. The trade of the clothier and fuller was as distinct as that of the hatter, and both have nearly disappeared. In Vermont, in 1810, 1,040,000 yards of cloths and flannels were woven in private families and dressed in these mills. In 1840 the census reported the existence of 2,585 fulling mills, which included the woolen mills (*a*), and it is probable that even at that late date the value of the woolen goods made in the household, with the assistance of these auxiliary mills, exceeded the value of the factory product. In 1850 the wool-carding establishments, exclusive of regular woolen factories, were returned as 630 in number, consuming wool to the value of $1,251,550 and manufacturing a product valued at $1,739,476. In 1860, when the census was more closely taken, the number of carding mills reported was 712, using 5,230,651 pounds of wool, of a value of $1,759,125, which were converted into rolls valued at $2,403,513. The geographical location of these mills show how strictly they were the pioneers of an advancing civilization. They had then almost disappeared from the New England states, but 64 being reported there, as compared with 99 in the middle states, 217 in the southern states, and 328 in the western states, with four establishments only in the Pacific states. The average value of the wool carded was 33½ cents a pound.

No data appear in the census reports of 1870 to show the number of carding mills included in the returns for that year. The census of 1880 had returns for 570 carding mills, which it did not separately report, and from 233 other mills, each of which used less than 5,000 pounds of wool per annum.

With the growth of the factory manufacture these custom carding mills are disappearing with accelerating rapidity, and there are now left in the United States but 193 distinct carding mills of which the special agent could obtain trace. These are very irregularly located, as shown in Table 15, where a distinct statement is made for them, although they are included as woolen mills in all preceding tables.

These 193 carding mills employed but 416 persons, all told, to whom were paid $61,618 in wages; they consumed but 874,253 pounds of scoured wool, which was chiefly converted into rolls for household use, and was worth $476,278 in that form. The very low average earnings indicated by the above figures was due primarily to the fact that most of these mills were in operation for portions of the census year only. Such wage statistics obviously have no proper place in the general statistics of the wool manufacture.

There were in addition a number of returns received upon the general manufacturing schedule from mills which ran a carding engine for a few months in the year in connection with the grist mill or sawmill, which comprised the chief business of the establishment. No effort was made to include any portion of these returns in the statistics of wool manufacture herewith presented, and the actual consumption of wool in carding mills is therefore in excess of the quantity stated.

The census of 1860 showed the employment of 1,276 persons in carding mills whose earnings aggregated $286,267, a much larger annual average than that shown in the statistics for 1890. This difference in the earnings as between the two periods is the most striking evidence of the decadence of the custom carding mills as a feature in the industrial condition of the country. While earnings in every other branch of wool manufacturing have greatly advanced they have here greatly fallen off.

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a See Census of Manufacturers, 1860, p. xlviii.

It was exceedingly difficult to obtain satisfactory returns for these carding mills. In a majority of cases the proprietors reported that they did their own work, often with the assistance of members of their own families, to whom they paid no wages. In many cases, also, they declined to put a value upon their product, for the reason that they carded the wool of their customers into rolls, never owning the wool themselves, but charging so much per pound for their labor. In other instances they received their pay in produce. The wool thus carded entered almost invariably into household manufacture, which still exists to a considerable extent, particularly in the states of Maine, Pennsylvania, Kentucky, Tennessee, Missouri, Wisconsin, and Minnesota.

The inclusion of these small carding mills in the number of establishments reporting has deprived that column of any value as a test of growth. Thus the total number of establishments reporting in the several censuses, was as follows:

1840	1,420	1870	3,456
1850	1,760	1880	2,689
1860	*a*1,673	1890	2,770

The number of actual mills in existence in 1890 was much larger than at any previous census, if these local industries are excluded.

It must also be considered that the "number of establishments" does not exactly represent the number of mills, for the reason that two and sometimes three mills, formerly reported separately, are frequently consolidated and operated under one management, from which but a single report is received.

SIZE OF WOOLEN MILLS.

The tendency of the industry is in the direction of larger mills. The majority of the establishments in the earlier days of the industry were one and two set mills, and this continues to be the case in the southern and western states. But in the eastern states the larger mills now greatly predominate, as is shown by the following table, which groups the woolen mills of the several geographical divisions according to their machinery capacity:

NUMBER OF MILLS OF EACH CLASS.

GEOGRAPHICAL DIVISIONS.	Total.	1 set.	2 set.	3 set.	4 set.	5 sets.	6 set.	7 set.	8 set.	9 set.	10 to 15 set.	15 to 20 set.	20 set and over.	Carding mills.
Total	1,656	364	246	157	133	79	100	55	66	29	127	47	60	193
New England states:														
Woolen mills	594	47	49	44	53	34	39	26	33	16	72	26	37	28
Hosiery and knitting mills	59	8	9	7	6	5	6	5	5	1	6	.....	1	.....
Middle states:														
Woolen mills	466	120	78	53	34	22	34	6	17	6	25	17	18	36
Hosiery and knitting mills	108	3	11	15	16	7	13	14	3	6	15	3	2	.....
Southern states:														
Woolen mills	197	57	38	10	8	2	.....	.....	1	.....	5	.....	1	75
Hosiery and knitting mills	2	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Western and Pacific states:														
Woolen mills	301	123	50	24	12	8	7	4	7	.....	4	1	1	54
Hosiery and knitting mills	19	6	4	4	4	1	.....	.....	.....	.....	.....	.....	.....	.....

GEOGRAPHICAL LOCATION OF THE INDUSTRY.

The American wool manufacture, during the period in which the household branch of it predominated, was scattered over wide sections of the country and into remote and inaccessible districts. This was naturally the case at a time when so large a proportion of the population literally made their own clothing, from the growing of the raw material to the weaving of the goods. Two causes tended to make the custom carding mill the genesis of the modern factory, and the wool manufacture of to-day is an evolution from the household industry to a degree and in a sense unknown in any other textile manufacture. These causes were the necessity of locating upon a stream for water power and the advantage of being near the supply of the raw material. The custom carding mill found its patronage in districts where the flocks abounded. As it developed into the primitive woolen factory, it was still a great advantage to be near the sheep, for transportation was difficult and costly. In the case of the early mill at Oriskany (New York), a large flock of merino sheep imported, owned, and cared for by the mill owners, was one of the adjuncts of the manufacture. As the flocks spread in the new states, the mills were planted in their midst, and not clustered in a few centers, as in Europe.

a Exclusive of carding mills.

This diffusion of the industry over wide areas is brought out strongly in the earlier censuses, and its modern tendency to gradual concentration is a most important deduction to be drawn from the present census. Ohio, in 1870, then our largest wool-growing state, reported 230 woolen mills, with 334 sets of machinery, distributed throughout the state. In 1890 the number of mills in Ohio had fallen to 113 and their machinery capacity to 112 sets. These Ohio mills were brought into existence by the proximity of the raw material, and they formerly used only the wool grown in their immediate neighborhood. What was true of Ohio was true also of Illinois, Indiana, Iowa, Michigan, Wisconsin, Missouri, and other western states which were prominent thirty and forty years ago as producers of the raw material of this manufacture.

It is a peculiarity of the wool industry here and everywhere that its original characteristics were largely determined by the quality of the domestic wool supply. Thus, Turkey, growing nothing but carpet wools, has manufactured few cloths, but her rugs and Smyrna carpets have found their way to all the markets of the world; England, where the long combing wool sheep was early developed, invented the countless dress fabrics for common consumption made from this fiber, and England's historic supremacy in the wool manufacture is due primarily to the superiority of her domestic wool clip; Germany, having produced the electoral fine wooled sheep, brought the manufacture of light and fine broadcloths to a perfection which was for a long period unrivaled elsewhere; France established her reputation for the finest all-wool goods, such as cashmeres, serges, and countless novelties of like character, as the result of her success in breeding the merino combing wools. So the United States, where originally the domestic wool supply consisted chiefly of the fleece of the Spanish merino, confined her manufacture for years chiefly to the strong, staple, plain fabrics for which this material is so well adapted.

The following table illustrates statistically the gradual geographical evolution of the industry and its modern tendency to localization. It shows the percentage of the total wool carding machinery of the country located in each of the chief manufacturing states at the several census periods since 1870:

WOOL CARDING MACHINERY, BY STATES, 1890, 1880, AND 1870.

STATES.	1890		1880		1870	
	Number of cards (sets).	Per cent of total.	Number of cards (sets).	Per cent of total.	Number of cards (sets).	Per cent of total.
Total	8,198	100.00	7,581	100.00	9,224	100.00
Massachusetts	1,837	22.41	1,660	21.90	1,512	16.39
Pennsylvania	1,299	15.84	1,155	15.24	1,468	15.92
New York	1,403	17.11	1,150	15.17	1,170	12.69
Rhode Island	572	6.98	495	6.53	490	5.31
Connecticut	646	7.88	622	8.20	752	8.15
New Hampshire	492	6.00	385	5.08	418	4.53
Maine	387	4.72	274	3.61	335	3.63
New Jersey	235	2.87	184	2.43	111	1.20
Vermont	157	1.91	167	2.20	200	2.17
Ohio	112	1.37	182	2.40	334	3.62
Indiana	153	1.87	160	2.11	346	3.75
Illinois	71	0.87	109	1.44	251	2.72
In above twelve states	7,364	89.83	6,543	86.31	7,387	80.08
All other states	834	10.17	1,038	13.69	1,837	19.92

If this table could be carried back of 1870 it would demonstrate even more strikingly the tendency to concentration exhibited during the last twenty years. In the woolen manufacture the New England states possessed in 1870, 40.18 per cent of our machinery capacity; in 1880, 47.52 per cent, and, in 1890, 49.90 per cent. Three middle states, Pennsylvania, New York, and New Jersey, possessed in 1870, 29.81 per cent; in 1880, 32.84 per cent, and in 1890, 35.82 per cent. All the remaining states in the union, which contained 30.01 per cent of our woolen machinery in 1870, contained but 19.64 per cent in 1880, and but 14.28 per cent in 1890. The eight leading states, as shown above, contained 67.82 per cent of this machinery in 1870 and 83.81 per cent in 1890. The enormous growth for the three census periods has thus been confined to these eight states, while in the remaining states there has been an actual loss of 55.29 per cent in machinery capacity.

To properly estimate the momentum of this gravitation, the worsted industry must be included, and this branch of the manufacture is confined almost wholly to the eight states above mentioned, as shown by the following table:

STATES.	1890		1880		1870	
	Number of combs.	Per cent of total.	Number of combs.	Per cent of total.	Number of combs.	Per cent of total.
Total	855	100.00	518	100.00	261	100.00
Massachusetts	265	30.99	190	36.68	172	65.90
Pennsylvania	191	22.34	124	23.94	29	11.11
New York	88	10.29	80	15.44	1	0.38
Rhode Island	195	22.81	70	13.51	7	2.68
Connecticut	34	3.98	21	4.06	34	13.03
New Hampshire	29	3.39	21	4.05	12	4.60
Maine	5	0.59	.....	.....	.....	.....
New Jersey	29	3.39	9	1.74	6	2.30
In above eight states	836	97.78	515	99.42	261	100.00
All other states	19	2.22	3	0.58	.....	.....

These eight states therefore may be regarded as the future seat of the woolen and worsted manufacture of the United States. They are the same states in which the cotton, silk, and allied industries predominate.

This tendency may be illustrated in another way. The three cities of Philadelphia, Lawrence, and Lowell consumed, in 1890, 83,587,642 pounds of wool, as follows:

	POUNDS.
Total	83,587,642
Philadelphia, Pennsylvania	52,739,329
Lawrence, Massachusetts	13,943,944
Lowell, Massachusetts	16,904,369

The wool consumption of these three cities was in excess of the amount of wool consumed in all the states of the Union combined, with the exception only of the six states of Massachusetts, Pennsylvania, Rhode Island, Connecticut, New York, and New Hampshire. These six states, with the addition of Maine and New Jersey, consumed in their manufactures 327,050,412 pounds of wool, while all the remaining states in the Union consumed but 45,747,001 pounds.

RANK OF THE STATES IN WOOL MANUFACTURE.

From the beginning of the century until 1880 the state of Massachusetts held undisputed supremacy as the chief wool manufacturing state of the Union. The status of the industry in Massachusetts, as shown by the state census, has been as follows in the years named:

CLASSIFICATION.	1845	1855	1865	1875	1885
Number of establishments	178	140	266	242	189
Capital	$5,604,002	$7,305,500	$9,477,276	$15,800,437	$20,095,668
Value of stock used	.....	.....	$22,746,593	$21,471,327	$19,422,953
Persons employed	7,372	10,090	18,965	19,193	18,970
Wages paid	.....	.....	.....	$5 542,015	$5,688,981
Value of goods made	$8,877,478	$12,105,512	$31,550,081	$36,469,626	$31,748,278

In 1880 the value of the products of Massachusetts woolen mills was surpassed by the value of Pennsylvania products, although Massachusetts continued to lead Pennsylvania in the amount of capital invested in the industry, and in the quantity of wool consumed, while Pennsylvania exceeded Massachusetts in the number of employés and in the amount of wages paid. The value of Massachusetts products in 1890 was $72,681,408, and the value of Pennsylvania products $89,337,419. In the manufacture of woolen and worsted goods proper Massachusetts may still claim the first rank, basing that claim upon the fact that her mills consumed in that year 99,569,455 pounds of wool, as compared with 70,041,261 pounds consumed in Pennsylvania. Except in the matter of capital invested, Pennsylvania now stands at the head of the list in all other particulars.

The state of New York retains the third rank among the states, due in 1890 as in 1880 to the great production of hosiery and knit goods, which comprised $24,776,582, in a total production valued at $53,340,151.

Connecticut and Rhode Island have changed places during the decade, the former state falling from the fourth to the fifth position, and the latter advancing from fifth to fourth. The actual decrease in the value of the products of the state of Connecticut has been commented upon elsewhere; but apart from this apparent decrease in Connecticut, the advance in Rhode Island has been phenomenal, the percentage of increase amounting to 60.57 per cent.

New Hampshire occupies the sixth rank among the states, which was also hers in 1880. New Jersey passes from the eighth to the seventh position, changing places with Maine. Ohio holds the ninth rank, closely pressed by Indiana and Vermont, and the twelfth state is Wisconsin, which has outstripped half a dozen states which were her superiors at the census of 1880.

Among the cities, Philadelphia now, as heretofore, occupies the first rank in the manufacture of woolen and worsted goods. The rank of the different cities in wool manufacturing, as determined by the value of their products in 1880 and 1890, was as follows:

CITIES.	RANK.		Value of products, 1890.
	1880	1890	
Total			$121,433,937
Philadelphia, Pennsylvania	1	1	73,713,856
Lawrence, Massachusetts	2	3	10,431,192
Providence, Rhode Island	3	2	18,237,531
Lowell, Massachusetts	4	4	7,037,174
New York, New York	5	5	4,377,337
Manchester, New Hampshire	6	6	2,963,550
Camden, New Jersey	(a)	7	2,507,031
Chester, Pennsylvania	(a)	8	2,166,266

a Not reported separately in 1880.

These eight cities manufactured in 1890 35.95 per cent of the total product of the industry.

The drifting of the manufacture into this comparatively limited area, and its consequent disappearance in other sections, is in no sense a sign of decadence, but is the evidence of the gradual response of this industry to the new conditions to which the development of the factory system has given rise in other industries. The wool manufacture, being in a sense the pioneer of all the textile industries, and more extensively pursued as a household art than any other which has yielded to the methods of the factory system, has in the nature of things been the last to resist the full application of those methods. It still retains characteristics of the household industry which have never been found at all either in the cotton or the silk manufacture as they are conducted in the United States.

Home-grown wool, as a rule, now seeks certain general markets, to be thence distributed to the mills contiguous to them. The distribution of the products, no longer made as formerly through local agencies, is now effected by a highly organized system of commission houses and selling agencies, most advantageously located in the large mercantile centers. Other advantages arising from this concentration increase in importance as the industry becomes more highly organized. One of them is the advantage in the labor market. The skilled operatives required in the wool manufacture are more easily obtained in the localities where there is the most work to be found. Hence practical men say that the best place to plant a new woolen mill is by the side of those which have been long established; and hence the towns and localities in the New England and middle states, which have become, either through accident or by reason of superior water, or water power, the centers of this industry, are likely to retain it and to show its largest future development. The possession of exceptional water power privileges made Lawrence and Lowell natural textile centers, and the water power of the Blackstone river was the original reason why Rhode Island is now so thickly studded with woolen and cotton mills. It will generally be found that superior water power is present at any point where the textile industries show a tendency to localize, although Philadelphia offers a marked exception to this rule, an exception explainable on the ground that the water of the Schuylkill river is especially fitted for the processes of the wool manufacture, while the development of steam has rendered water power less essential to successful manufacture than in the early days of the industry.

Some effort has been made to attribute the localization of the wool manufacture to climatic conditions. Mr. Henry Mitchell, a Bradford (England) manufacturer, testified before a Royal Commission in 1885 that the matter of climate has much to do with the successful wool manufacture, particularly of worsted yarns, and on this point he said:

> I do not think the Americans will ever be able to make yarns so good as we can in this country. The climate of the United States is very unfavorable for the spinning of worsted yarns. The very great changes that take place, the intense heat in summer and the intense cold in winter, are very unfavorable to the spinning of our yarns. A moist climate is more suitable for them. This does not apply to the same extent to Germany. I think it likely that Germany in time will be able to supply their own manufacturers with those yarns.

While there is much truth in what Mr. Mitchell says about the influence of a moist atmosphere in spinning worsted yarns, it is also true that modern mechanical devices for moistening the atmosphere and regulating the temperature of spinning rooms have rendered the question of outside temperature and humidity one of little importance.

SPECIALIZATION OF THE INDUSTRY.

Another advantage growing out of the concentration of the industry is due to the differentiation or subdivision of the manufacture, which has long marked it in Great Britain, and is gradually finding its way into the conduct of the industry in the United States. All the processes of manufacture were uniformly conducted under one roof in the primitive woolen mill of America, a method of manufacture necessitated by its widely scattered location. To-day it is common to find mills devoted exclusively to the manufacture of yarns for sale. Other mills, while making some portion of their own yarns, weave largely in excess of their yarn production, and still other mills simply dye and finish the goods sent them by weaving establishments.

This specialization has already produced results, as applied in this country, similar to those which M. Alcan attributed to it in France: "it facilitates the labor, concentrates the aptitudes, regulates the production, and contributes to ameliorate the results and the economic conditions. Specialization renders the industry accessible to all, to moderate fortunes as well as large capital". By reason of the separate establishment of yarn mills, equipped to supply on quick notice all counts and varieties of worsted yarns, many woolen mills were enabled to turn their product at once into worsteds in response to a sudden change in popular taste without the necessity of radically altering their machinery equipment.

As this tendency to specialization becomes more marked in this country, and the conditions surrounding the manufacture approximate more closely those existing in England and on the continent, we may expect the industry to become more diffused, with an increase in the number of establishments of small capital, by reason of the smaller investment required for machinery.

The rapidity with which this specialization has advanced during the last decade is shown by the statistics of yarns made for sale. The quantity of worsted yarns so made in 1880 was 13,022,219 pounds, and in 1890 it had risen to 29,376,182 pounds. There was a smaller increase in the quantity of woolen yarn made for sale, the quantity in 1880 being 28,581,950 pounds, and in 1890 35,415,360 pounds.

It is this differentiation of the manufacture which has made Philadelphia the chief textile center of the United States, producing in the census year, 1890, 21.82 per cent of the entire wool manufacture of the country, and fast placing the manufacture there upon a footing like that which prevails in Bradford, England, where the scouring of the wool is done by one establishment, the carding and combing by another, the spinning by another, the weaving by another, the dyeing and finishing by still others, while the packing of the goods for the market often constitutes still another distinct subdivision of the business. This minute subdivision of the industry is largely the outgrowth of conditions rather than a tendency evolved from experience; but it may be said to be definitely determined that the best results are attained by it. Under this system a community like Bradford is a great beehive of interdependent industries, the separate stages of the manufacture being carried on in separate establishments. The whole energy of the management in each branch is devoted to securing the best results in that particular branch under the most economical conditions.

PECULIAR DIFFICULTIES AND VICISSITUDES OF THE INDUSTRY.

It is the commonly accepted belief, for which there is ample explanation, that the wool manufacture is the most hazardous and precarious of all lines of manufacture. Chief among the reasons for this is its dependence upon the changes of fashion. In the cotton manufacture the whole product of a mill will frequently consist of a single fabric. Samuel Batchelder, in his "Notes on the Introduction of the Cotton Manufacture" (1863), states that "thousands of looms are employed making drillings of precisely the same description, with the same number of threads both in the warp and filling, of the same average weight, with yarn of the same fineness, and without the least variation in any particular, as were first invented and made by me in 1827". In the modern wool manufacture the requirements of fashion demand new patterns every season. A large fancy cassimere mill will produce 200 to 1,000 distinct designs each season, adding greatly to the cost of manufacture. In some mills there are made not less than 50 distinct varieties or classes of fabrics, exclusive of styles. Success in the manufacture may therefore be said to depend upon a capacity to understand the popular taste, to anticipate its demands, often capricious and incomprehensible, and to adapt the product of the mill to the requirements of the market. It frequently happens that the entire output of a season will be thrown back upon the manufacturer because of some failure of pattern or coloring to conform to the popular whim. Such a catastrophe will in many cases bring ruin, where a prosperous season might have been predicated upon the experience of the season previous. The liability of the American manufacturer to calamities of this description is increased by the habit which prevails in the United States of determining the fashions in garments by standards which are set abroad.

Again, the woolen manufacturer deals with an expensive and peculiar raw material. No degree of skill in the selection of the raw material of other fabrics is equal to that required in buying and applying wool. Its preparation is also more difficult, and the finish of its products is much more complicated. The manufacturer suffers constant loss in consequence of minor defects in fabrication. An entire cut of cloth will be thrown back upon him in consequence of mispicks, threads out, or other defects, due to careless weaving. The perils of the

dyeing and finishing rooms are even greater. The dyeing of wool fabrics requires what is a distinct art by itself in Europe; and in some branches, such as the indigo fermenting vat, is the most difficult work in practical chemistry. Some slight miscalculation in the combination of dyes or acids will weaken or depreciate the fabric and throw it into "seconds".

Some branches of the wool manufacture, like carpets, require the most complete knowledge of the principles of decorative art; others, like that of printing stuffs, are based upon a knowledge of the chemical arts. No other manufacture brings so fully into play the results of scientific research and the practical applications of art, while the delicacy of its operations greatly increases the risks and adds to the cost of manufacture.

Still another obstacle in the way of success in the wool manufacture in the United States is the terms of sale which, as a rule, now prevail with those whose product finds the market through the commission houses. These terms of sale frequently compel the manufacturer to begin a season's manufacture before he has received his payment for the goods of the previous season, and only abundant capital can stand the strain of these conditions. The accumulation of goods in commission houses, the cancellation of orders for goods already manufactured or in process, the long credits, the risks of carelessness by operatives, all combine to make conditions under which it is not surprising that many fail, and it is not necessary to look beyond these conditions to find adequate explanation of the fact that the proportion of failures is larger in this branch of manufacturing than in any other.

The large percentage of idle machinery found during the census year thus has another explanation, which is perhaps the most comprehensive of all. The volume of capital which has been sunk in this branch of manufacturing will bear a larger proportion to the total capital invested than in any other. Instances are frequent where the money expended in equipping a woolen plant has been entirely lost before that plant has been finally brought to the point of earning a fair return upon the active capital required in its operation. In this way it happens that the New England and middle states are full of mills which have passed through many hands, and are only identified with the establishments reporting ten or twenty years previously, by the fact that they occupy the same premises.

It is apparent from this résumé of the conditions surrounding the wool manufacture that it is an industry in which success on any extended scale requires an unusual degree of intelligence and skill. This fact may explain in some degree the remarkable changes which have occurred in the personnel of those conducting it in the United States. The degree of this change has been shown to the special agent by a careful comparison of the lists of the manufacturers reporting to the censuses of 1870, 1880, and 1890. The changes in the names of these manufacturers indicate that the financial mortality among them has been frightful. The wool schedule contained an inquiry as to the date of establishment of each mill reporting; 2,377 replied to it, and the result of these replies shows that about 50 per cent of these establishments were organized in the last census decade, 1880–1890. While in numerous instances it is probable that the date of the reorganization of a mill has been improperly given as the date of its origin, yet the actual proportion is not far from that stated.

CAPITAL.

It is obvious that the amount of capital employed in the wool manufacture has never been fully reported. In 1880 it was given as $159,091,869, to manufacture products valued at $267,252,913. In 1890 it is reported at $296,494,481, not including value of hired property, to manufacture a product valued at $337,768,524, an apparent increase of 86.37 per cent in the capital, as against an increase of but 26.39 per cent in the value of products.

There was, in reality, no such increase in the capital employed. The actual increase was probably something higher than the increase in products, allowance being necessary in measuring the relations of the two items for the fall in values.

The more exact form of the inquiry of the schedule of 1890, in relation to capital, has led to a much closer return than ever before. In the special schedule relating to wool manufacture in 1880, this question read as follows:

58. Amount of capital invested in works and employed in business, including both fixed and active capital or surplus.

While this question apparently covers the same ground as the more detailed question of 1890, it is made evident by an inspection of the returns under it that it was not so regarded, and that materials and stock on hand and goods in process were as a rule overlooked, as proper items of active capital employed. Just to what extent they were overlooked it is impossible to say, because the census of 1880 did not classify the capital employed into the fixed capital invested in land, buildings, and machinery, and that required to carry on the business. We find the fixed capital thus invested in 1890 to be $129,721,571, or almost equivalent to the total amount of capital reported in 1880. This establishes the meagerness of the return of active capital in 1880.

The fixed capital represented $14,954,323 invested in land, $40,144,544 invested in buildings, and $74,622,704 invested in machinery, or in the proportion of 11.53 per cent invested in land, 30.95 per cent in buildings, and 57.52 per cent in machinery. In addition to the above, $17,320,780 of hired property was utilized in the wool manufacture, which is not included in the above statement of fixed capital. Of the three items, that of land is the one which contains the most elements of flexibility. There are many instances in which the land value is determined by the fact that the factory exists upon it. The wool manufacture is in many instances an isolated industry, often the

only one in the town, and its disappearance would take from the land the greater part of the value now nominally attaching to it. The status of the two industries of wool and cotton manufacturing presents a marked contrast in the matter of the capital invested in realty. The latter industry is more concentrated and is usually conducted in buildings more expensively constructed. While the product reported for the cotton manufacture has a value of $69,786,800 less than that of the wool manufacture, the capital invested in its plant is $101,271,996 in excess of that invested in wool manufacture.

On the other hand, when we turn to the live assets, we find the active capital employed in the wool industry $43,745,634 in excess of the similar items in the cotton manufacture. This fact is also in accord with well-known conditions surrounding the two industries. The conduct of the wool manufacture requires a larger capital than cotton, because of the much higher cost of the raw material employed, and of the longer time required to carry the stock through the various processes of the manufacture.

Of the active capital employed a large portion is borrowed money, and the amount of the liabilities of different mills varies greatly at different seasons, in accordance with the conditions at the time, whether it is at the beginning or the close of a season's operations. It is impossible under these circumstances to arbitrarily determine the total amount of active capital required to carry on this industry for a year of operations; but that the amount reached by this investigation, $166,772,910, is a fair average for the operations of the census year is determined by two tests.

First. It occupies the proper relationship to the fixed capital invested in plant. Most woolen mills will require active capital equal to or in excess of the cost of the investment to carry on operations. The proportions will vary in different mills, according to their methods, the state of their surplus, and the magnitude of their operations, but for a general average the above statement is correct.

Second. It is a general rule that a well-conducted wool manufacturing establishment will turn its active capital twice in a year. The value of the product here reported is a few million dollars more than double the $166,772,910 of active capital returned, and it therefore represents a value of product such as may be regarded by commercial tests as requiring that amount of active capital to produce.

Analyzed in this way, we find that the statement of capital invested is in keeping with all the other conditions, and it may therefore be claimed for it that it is an accurate presentation of this important and perplexing feature of census investigation. Hitherto the returns of capital have been abnormally low when measured by the collateral statistics. In the present investigation they show what would otherwise be an abnormal increase, the apparent increase being largely due to closer methods of inquiry in the later census.

The tendency in woolen manufacturing of late years has distinctly been in the direction of the corporate form of management, although it is much less marked in this industry than in the cotton manufacture. The Massachusetts census of 1885 shows that more than two-thirds of the cotton manufacturing establishments of that state were corporations, while of the woolen goods establishments nearly eight-tenths were private concerns. Over 95 per cent of the capital employed in Massachusetts cotton manufacturing was invested in a corporate form, and about 50 per cent of the capital employed in woolens was so invested. In other words, the very large woolen establishments are as a rule corporations, and the smaller mills are as a rule under private management. The figures for Massachusetts may be taken as a fair criterion of the conditions existing in other states. There is a prevalent opinion that the best results in wool manufacturing have hitherto been attained in this country under private management, and that this is due to the peculiar surroundings of the industry as contrasted with the cotton manufacture, which are commented upon in this report. Mr. Bond has written that nearly all the corporations engaged in wool manufacturing prior to 1857 had failed disastrously, many of them under stress of financial crises, which private mill owners successfully withstood, because their profits were not all distributed to stockholders in times of prosperity without sufficient regard to the great uncertainty peculiar to the industry. On the other hand, as competition grows closer and margins smaller, the advantages which spring from large capital and large product are becoming more defined.

EARNINGS OF CAPITAL.

These statistics do not show anything whatever regarding the profits made in the business of wool manufacturing. The schedule was so constructed, in its grouping of accounts current with the live capital or assets, as to prevent it from showing a true balance sheet of the business, and as a matter of fact it was impossible to determine from the individual schedules received whether the business had been conducted at a profit or a loss during the year covered by the report.

This statement is made in order to prevent any attempt, by adding together all the items of expense reported and subtracting the sum from the value of the goods made, to represent the remainder as the profits of those reporting. This remainder will have no closer relation to these profits than any other which might be arbitrarily fixed upon for that purpose, and for the reason indicated.

If thus figured, a result is shown equivalent to earnings of between 11 and 12 per cent on the gross value of the product, and even larger upon the capital invested. As a matter of fact, the gross profits of the wool manufacture will not average any such percentage, and the net profits, after sufficient allowance has been made for interest on plant, wear and tear, business losses, and the necessary replacement of machinery, will be still less.

DUPLICATION OF PRODUCTS.

Another aspect of the statistics may be properly brought to attention in the same connection, because it presents a second insurmountable obstacle in estimating the profits of wool manufacturing on the basis of the census returns.

Such an estimate is statistically impossible, for the reason that the value of product reported includes a large element of duplication. Thus many mills are engaged exclusively in the manufacture of yarns for sale, while others make yarns both for sale and for weaving by their own machinery. The yarns thus sold constitute the finished product of these manufacturers and therefore enter into the total value of products; but they are simply the raw material of their purchasers, and appear again in the column of products, plus the added value of their weaving and finishing.

The fact that the value of yarns purchased is added to the cost of materials purchased might seem at first sight to afford a fair offset and confirm the approximate accuracy of the method of calculation above stated; but inasmuch as this method involves a computation based upon two profits instead of one, the profit of the yarn spinner as well as the profit of the yarn weaver, the estimate of profits is statistically impossible. The amount and value of duplicated products are given under the topic of "Products" on page 47.

The limitations we are now considering involve no just criticism upon the value of census statistics of manufactures. These duplications are inevitable in any inquiry which treats an industry as a homogeneous whole, and follows it through the several stages in which the finished product of one mill becomes the raw material of another. They were pointed out by Superintendent Walker, in connection with the statistics of manufactures in the census of 1870, and they may be easily estimated, with substantial accuracy, for the purpose of ascertaining the net value of products as distinguished from their gross value.

MISCELLANEOUS EXPENSES.

Little explanation is required under this item of expenditure, which now appears for the first time in the census of wool manufactures. It covers all the expenses connected with the running of a mill, outside the cost of materials and labor, such as rent, taxes, insurance, ordinary repairs, interest on cash used in the business, and the countless sundry expenditures peculiar to the conduct of any manufacturing business. These miscellaneous expenses foot up $19,249,508, which is 6.44 per cent of the total expenditures of the mills reporting, the cost of materials used being 67.92 per cent and cost of labor 25.64 per cent.

The division of these miscellaneous expenses into their several groups is as follows:

Total	$19,249,508
Rent paid for tenancy	1,348,818
Taxes	1,174,793
Insurance	1,353,049
Repairs, ordinary, of buildings and machinery	3,179,531
Interest paid on cash used in the business	5,841,963
Sundries, not elsewhere reported	6,351,354

The amounts reported as paid for taxes and for insurance are nearly the same; but in both cases the returns were defective, and no averages can be based upon them. The amounts paid, both for taxes and insurance, are much greater than reported. To illustrate: Of 113 establishments reporting in the state of Ohio only 101 reported any taxes paid and only 80 reported insurance. Of 56 establishments reporting from Wisconsin, 51 reported the amount of taxes paid and 45 reported insurance. Of 82 establishments reporting from Maine, 68 reported the amount of taxes paid and 55 the annual cost of insurance. Several Maine establishments reported exemption from taxation under local ordinances, and this exemption exists, to a limited degree, in some other states. In the matter of insurance there are many smaller mills, particularly in the west, which carry none. Owing to the defective character of the returns under these heads it is a fair conclusion that the total of $19,249,508 returned as the sum of "miscellaneous expenses" in the manufacture is smaller, by several millions, than the actual annual expenditures of the industry for these purposes.

MACHINERY OF THE WOOL MANUFACTURE.

The best test of the growth of the wool manufacture is not the number of establishments or the relative value of the products, but the increase in the machinery capacity. The comparative figures are as follows, for 1890 and 1880:

MACHINERY.	1890	1880	Percentage of increase.
Cards	8,198	7,581	8.14
Combing machines	855	518	65.06
Spindles	3,182,500	2,254,996	41.13
Looms	69,807	59,261	17.80

These figures, however, afford only a general clew to the increase in machinery capacity between the decades, and there are serious difficulties in the way of applying any exact standard of comparison.

In the woolen manufacture proper the set of cards has been uniformly accepted in the United States as the unit of capacity, and it has been adopted for this census. In Great Britain and the continental countries the spindle is generally accepted as the unit in the wool manufacture as in the cotton industry, and no record of cards in operation appears in the limited statistics of foreign countries.

There can be no doubt that the spindle is an accurate unit of capacity so far as the worsted manufacture is concerned.

In the woolen manufacture practical men regard the card as the most accurate unit of capacity, for the reason that in spinning woolen yarns much stock is run twice on the mules to obtain fine numbers of yarns, and the number of spindles operated is therefore not an accurate test.

The returns of machinery to this census have been so taken that either the card or the spindle can be hereafter adopted as the measure of capacity in making comparisons. But the conclusion is forced upon us that no such thing as a uniform and accurate standard of the machinery capacity of the wool manufacture is possible.

Entirely different results follow from the application of the two standards, the card and the spindle, to the growth of the industry in the decade from 1880 to 1890. This is because the worsted manufacture, in which the card does not necessarily appear as an essential machine, has grown very much faster than the woolen manufacture proper. Thus, the total number of sets of cards reported in operation in 1880 was 7,581, and in 1890 8,198, an increase of 8.14 per cent, while the spindles reported in 1880 were 2,254,996, and in 1890 3,182,500, an increase of 41.13 per cent. The percentage was really larger, as many cotton spindles reported with woolen and worsted spindles in 1880 are now reported with cotton manufacture.

CARDING MACHINES.

The difficulty with the card, as a unit of machinery capacity, arises from the diversity of the carding engine in capacity, in structure, and in use. No other evidence of this is required than the fact that the number of sets of cards reported by the census of 1870 was 9,224, and in 1880 it was only 7,581, but the actual production of our woolen mills in the latter year was far in excess of their production in 1870. This was partly because a larger proportion of the carding machines reported in 1880 were the one-cylinder machines employed in custom carding, the number of which has been rapidly decreasing as the household industry has been superseded.

The actual capacity of the regulation set of cards, with three cylinders, has also been greatly increased. As the carding engine is long-lived and expensive many of the older types remain in operation, particularly in the smaller mills, and their productive capacity is hardly one-half that of modern machines of nearly double their width and of greater diameter. The great improvements in the American system of wool carding date from about 1860. At that time the machines in common use were mounted on wooden frames, the main cylinders being 40 inches wide and 42 inches in diameter. During the civil war a few iron doffers, and then iron strippers, began to be made, after which the workers were made of iron. The cylinders are now frequently 60 inches in width and 48, 54, and 60 inches in diameter. The capacity of carding machines has been further increased by taking off a larger number of ends from the finisher cards, using narrower rings, thus allowing more material to run through the breakers.

An analysis of the returns at this census shows the following results as to the prevailing present width of cylinders:

NUMBER AND WIDTH OF CARDS, BY STATES AND TERRITORIES: 1890.

STATES AND TERRITORIES.	Actual number of sets in each state.	Number reporting width.	NUMBER OF CARDS OF EACH WIDTH REPORTED.								
			24 inches.	30 inches.	36 inches.	40 inches.	48 inches.	54 inches.	60 inches.	72 inches.	Miscellaneous.
Total	8,198	8,077	445	126	174	2,080	4,156	19	1,013	10	54
Alabama	8	8	4	1	.....	1	2	.....	.....	.....	.....
Arkansas	7	7	5	.....	1	1	.....	.....	.....	.....	.....
California	70	70	.....	.....	.....	15	55	.....	.....	.....	.....
Connecticut	646	646	18	.....	.....	180	432	.....	14	.....	2
Delaware	15	15	.....	.....	.....	.....	4	.....	11	.....	.....
Georgia	22	22	11	.....	.....	.....	9	.....	2	.....	.....
Idaho	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	71	71	3	5	2	23	30	.....	8	.....	.....
Indiana	153	150	15	3	.....	34	69	1	28	.....	.....
Iowa	36	36	2	1	2	17	14	.....	.....	.....	.....
Kansas	1	1	.....	.....	.....	.....	1	.....	.....	.....	.....
Kentucky	104	104	27	4	1	6	28	.....	38	.....	.....
Louisiana	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....
Maine	387	385	19	5	13	159	181	.....	8	.....	.....
Maryland	30	30	3	.....	3	3	2	.....	19	.....	.....

NUMBER AND WIDTH OF CARDS, BY STATES AND TERRITORIES: 1890—Continued.

STATES AND TERRITORIES.	Actual number of sets in each state.	Number reporting width.	NUMBER OF CARDS OF EACH WIDTH REPORTED.								
			24 inches.	30 inches.	36 inches.	40 inches.	48 inches.	54 inches.	60 inches.	72 inches.	Miscellaneous.
Massachusetts	1,837	1,808	29	.....	34	501	1,162	7	71	3	1
Michigan	68	68	14	5	1	17	25	.....	6	.....	.....
Minnesota	37	37	6	8	3	18	2	.....	.....	.....	.....
Mississippi	31	31	3	.....	3	4	10	.....	11	.....	.....
Missouri	52	52	18	6	2	9	12	.....	5	.....	.....
New Hampshire	492	481	5	1	6	281	176	3	7	1	1
New Jersey	235	235	1	7	5	4	164	.....	48	.....	6
New York	1,403	1,401	68	7	23	533	637	.....	88	6	39
North Carolina	35	28	9	6	4	4	3	2	.....	.....	.....
Ohio	112	112	26	11	6	28	27	1	8	.....	5
Oregon	21	21	1	.....	.....	2	18	.....	.....	.....	.....
Pennsylvania	1,299	1,233	87	24	36	96	428	1	561	.....	.....
Rhode Island	572	572	.....	1	14	52	476	3	26	.....	.....
South Carolina	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	3	3	1	.....	.....	1	1	.....	.....	.....	.....
Tennessee	80	79	27	8	4	9	14	.....	17	.....	.....
Texas	9	9	1	.....	.....	2	2	.....	4	.....	.....
Utah	31	31	5	1	1	2	22	.....	.....	.....	.....
Vermont	157	157	10	.....	3	32	96	.....	16	.....	.....
Virginia	60	60	1	14	3	15	21	1	5	.....	.....
West Virginia	42	42	17	1	4	14	5	.....	1	.....	.....
Wisconsin	69	69	6	7	.....	17	28	.....	11	.....	.....

This table demonstrates the insufficiency of the card as a unit of measurement by bringing out the great disparity in the width; that is, the capacity of the cards in operation. Of the 1,013 60-inch cards reported, 561 were located in the state of Pennsylvania, which indicates that the manufacturers of that state have been enlarging the capacity of their machinery more rapidly than those located elsewhere.

In 1880 and 1890 the special schedule contained an inquiry intended to reveal, in the one case, the average capacity per set of cards in pounds of clean wool, and in the other the average consumption per set, reckoned on full time, in clean stock as prepared for the cards. Mr. Bond tabulated and published the replies received to this question. They were also tabulated for the present census; but examination of the results made it evident that they were of little value, and they have therefore been abandoned.

The purpose was to obtain a basis for an estimate of the machinery capacity of the country in excess of its actual consumption. Mr. Bond's figures throw no light on this question, for the reason, among others, that they take no cognizance of the cotton, shoddy, and other materials passing over the cards in admixture with wool. Any statistics which depend upon so many diverse and constantly varying conditions might as well not be attempted. According to Mr. Bond's tables the average daily capacity of the woolen cards in 1880 was 764,000 pounds, or an average of 128 pounds per set per diem. By the present returns the average daily capacity of consumption, reckoned on full time, was 1,124,361 pounds, or 174 pounds per diem per set of cards. This was for the number of mills reporting, which did not include many of the smaller mills. Inquiry of manufacturers establishes that the average capacity of a modern set of cards varies from 100 to 300 pounds per day, being dependent upon the quality of stock and the purpose for which it is to be used. This statement, founded upon individual experience, is worth more than any averages obtained from the returns made by individual manufacturers engaged upon every variety of work.

It is clear from the above that the average capacity of woolen cards, as operated in 1890, was considerably in excess of their average capacity in 1880; and also that the actual capacity of our woolen mills as now organized is greatly in excess of their output, as was also the case in 1880. How much this output could have been exceeded had the demand for the goods existed it is impossible to say on the data obtained.

COMBING MACHINES.

The great increase in the machinery capacity of the United States between 1880 and 1890 has come through the introduction of worsted machinery, which has in many mills taken the place of the woolen card. No other phase of the manufacture so well demonstrates its development. In 1860 the number of combing machines was confined to the equipment of the 3 establishments engaged in the manufacture of worsted stuff goods, and a few carpet yarn spinners. In 1870 we had but 261 combing machines in the whole country. The census of 1880 reported 518 combing machines, an increase of 98.47 per cent over 1870, and the census of 1890 shows 855, a further increase of 65.06 per cent over 1880.

A combing machine, with its accompanying preparatory machinery, is estimated to equal the productive capacity of from 2 to 3 sets of cards. (*a*) On this basis the worsted machinery of the country was equivalent in its capacity to one quarter of the capacity of the woolen machinery, an estimate borne out by the relative consumption of raw materials and the relative value of products.

Of the 855 combing machines in use in 1890, 181 were of American manufacture, as compared with 134 in 1880, showing that the American manufacture of combing machines had gained but slightly in the ten years. There were 91 American made combing machines employed in the carpet manufacture in 1880, and but 41 in 1890.

The comb is one of the most delicate and expensive machines employed in the textile industries, and the efforts of the American builders to supply the home market have been hampered by the fact that the English makers have had a much longer experience with them. The preparatory machinery used in connection with the comb is now very largely manufactured in this country. Of the machinery connected with the card, practically all is made in the United States.

Although the development of industrial mechanism may be substantially the same in different countries, yet in each it shows peculiarities having their origin in each. Thus, the French system of spinning had its origin in the peculiarities of Heilman's combing machine, as contrasted with the English combing machines invented about the same time. It differs from the English method particularly in the drawing processes; the sliver is never twisted, but is only drawn out, at the same time that the fibers are constantly kept in a state of parallelism by passing over a circular comb. Each method has its advantages over the other. M. Charles Leroux, a French expert in worsted spinning, writes that while English yarns are sold in the French markets at lower prices than the French yarns, this is true only of the coarser numbers, and he adds, "a convincing proof of the superiority of the French method of spinning over the English method is that they have vainly attempted to spin cashmere yarn in fine numbers upon their frames in competition with us. Their mode of preparing wools for the process of spinning is not adapted to these numbers". One of the evidences of the advancement of the American manufacture into the higher branches of the industry during the last decade has been the equipment of several large mills with machinery adapted to the French system of spinning.

A distinction also exists between the carding machinery of England and the United States, but it results in no essential difference in processes. It is simply a difference in structure, due to the independent evolution of the carding engine in the two countries. The English carding machinery consists of a scribbler, containing two swifts, an intermediate, also with two swifts, and a carder, containing two swifts and a condenser. The American system has the same set of three machines (called here the first breaker, second breaker, and finisher), but each engine carries but one swift or cylinder. Similar structural differences exist in the apparatus for spinning woolen yarns employed in the two countries.

SPINDLES.

Table 4 indicates the number of spindles actively employed in the wool manufacture in 1890 as 3,182,500, as compared with 2,254,996 in 1880, an increase of 41.13 per cent.

This total number of spindles was subdivided into 2,329,099 woolen spindles, 657,324 worsted spindles, and 196,077 cotton spindles. Of the woolen spindles, 1,742,288 were located in woolen mills proper, as compared with 1,720,820 so located in 1880. Of the remainder, 207,180 were located in worsted mills and 312,756 in hosiery and knit goods mills, with 53,046 in carpet mills and 13,829 in felt mills. The worsted spindles were located: 479,675 in worsted mills, 151,132 in carpet mills, 19,750 in woolen mills, and 6,767 in hosiery and knit goods mills. This location of spindles illustrates how closely intertwined are the two branches of woolen and worsted manufacture, and why it is impossible to make an absolute statistical separation of these two branches.

The cotton spindles were located: 68,225 in worsted mills, 69,830 in hosiery and knit goods mills, 53,342 in woolen mills, and 4,680 in carpet mills. In the former case the spindles were employed almost wholly in spinning cotton-warp yarn for worsted dress goods and suitings. They were far from equaling the consumption of these mills

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a The estimates of practical manufacturers vary on this question, the variation being due to the different qualities and varieties of wool used and numbers of yarn to be spun. The following replies to letters of inquiry are submitted:

WANSKUCK MILLS,
PROVIDENCE, RHODE ISLAND, March 15, 1892.

Yours of the 14th instant at hand. One wool card, 48 inches, will use about 80 pounds of stock per day, and one Noble comb on the same stock will comb twice as much.

Yours truly,

JESSE H. METCALF, *Superintendent.*

PROVIDENCE, RHODE ISLAND, March 15, 1892.

A set of woolen cards 48 inches wide, making roving for an 8-run yarn with 48 rings, will produce from 75 to 80 pounds per day, and a card using a Bolette condenser would produce on the same work from 90 to 100 pounds per day. A Noble comb, making tops for 23 worsted yarn, would produce about 350 pounds per day. These figures are based on a very fine grade of wool, such as we would be obliged to use to spin up to 8-run yarn.

Yours truly,

PROVIDENCE WORSTED MILLS.

UTICA, NEW YORK, March 15, 1892.

The consumptive capacity of 1 set of woolen cards 48 inches wide, making roving for 8-run yarn as we run them, would be about 100 pounds per day, and of one Noble comb, making tops for No. 23 worsted yarn, would be about 350 pounds per day.

Yours truly,

ROBT. MIDDLETON, *President.*

in cotton yarns, as is shown by the total of 9,454,874 pounds of such yarns purchased for the use of the worsted mills. In large degree these latter yarns were simply transferred from the cotton to the worsted branch of the same general establishments. The cotton mills connected with such establishments as the Arlington, the Pacific, the Manchester, and the Lorraine mills are returned under the cotton census, and only figure here in the item of cotton yarns purchased. This method of separation was not pursued in the census of 1880, and that census took no account of the number of cotton spindles in operation in woolen and worsted mills, but grouped them all either as woolen or worsted spindles.

The hosiery and knit goods establishments operated 69,830 cotton spindles exclusively upon cotton hosiery yarns. How far behind their consumption of cotton yarns was the spinning capacity of this class of mills is shown by the purchase of 32,248,849 pounds of cotton yarns for use in manufacturing hosiery and knit goods. These mills largely rely upon spinning mills for their yarns, their purchase of 6,386,370 pounds of woolen yarns and 4,146,035 pounds of worsted yarns, in addition to the cotton yarns above stated, indicating that their consumption of yarns was about 30 per cent greater than their own product.

DOUBLING SPINDLES.

No separation of spindles into spinning and doubling spindles was called for on the schedule. In the English returns, under the "Factories and workshops act", this separation is made. In the woolen mills of Great Britain, in 1889, there were 3,107,209 spinning spindles and 299,793 doubling spindles, showing a proportion of 10.36 to 1. In the worsted mills there were 2,402,922 spinning spindles in the same year, and 669,328 doubling spindles, showing a proportion of 3.59 to 1. If the same proportion exists in the United States, and it must be approximately the same, the division of the spindles reported would be as follows:

SPINDLES.	Woolen.	Worsted.
Total	2,329,099	657,324
Spinning	2,124,073	514,116
Doubling	205,026	143,208

Spinning in woolen mills is performed upon the mule and in worsted mills upon the spinning frame where the English system is employed and upon the mule with the French system. There have been no radical changes in the method of spinning woolen yarn since the adoption of the self-acting mule, although slight changes in the mechanism have perceptibly increased the efficiency of the machinery. In all American mills down to the close of the civil war the spinning continued to be done on the hand-jack, which is still found in many of our smaller mills. In this respect American mills were some twenty-five years behind those of Great Britain. Automatic mules of English make were imported and their use was attempted, but not with satisfactory results. The English machines, being adapted to spinning uniform numbers, were ill adapted to the needs of the American manufacturer at that time, compelled as he was to use yarns of different numbers adapted to a variety of products. Several American inventors, working independently, succeeded in so far perfecting the automatic mule that a number were put in operation about 1868, (*a*) the first, it is believed, in the Chase mill at Webster, Massachusetts, and gradually several machines were perfected, which are peculiar to America and better adapted to the needs of the industry here than the spinning apparatus of any other country. The introduction of the automatic mule, which became general between the years 1870 and 1875, has enormously facilitated the manufacture.

It is stated by careful manufacturers that the substitution of the automatic or self-acting mule, with the improved machinery which has come during the same period, has resulted in a gain of from 33 to 50 per cent in productive capacity. The economic gain in the expenditure of labor is even more striking, two persons now easily accomplishing as much as four on the hand-jack. Experts have calculated the difference between hand-jacks and mules in the cost of manufacture as follows: 48 cents per 100 runs of yarn, with the jack; 20 cents with the mule, or less than one-half. There is also a great saving in the waste and a great gain in the uniformity of the product.

The hand-jack carries 140 to 240 or 300 spindles, revolving from 3,000 to 4,000 times a minute. Mules carry usually 300 to 480 spindles, but the number is now sometimes increased to 600. The number of revolutions is about the same.

In the organization of a woolen mill with one set of cards, from 10 to 15 horse power is required, which will keep from 300 to 500 spindles in motion; but this relationship varies greatly, according to the class of goods manufactured, the age of the machinery, and the capability of superintendents. American woolen mills vary in their equipment all

a Several authorities place the date of the introduction of the automatic mule several years earlier. Mr. William B. Weeden, of the Weybosset Mills, writes the special agent as follows:

PROVIDENCE, February 1, 1893.

DEAR SIR: In respect of automatic mules for spinning wool, several patterns of cotton mules were rudely adapted to that work in Lawrence and Manchester during the war, or as early as 1863. About the same time woolen mules were imported from England. Seth D. Paul adapted the Sharp and Robert pattern to the work of spinning wool. The Saco Water Power Machine Company built these automatic woolen mules, and a pair was started at the Weybosset mills in March, 1865. Machines of this description ran successfully for many years. Paul, who was an earnest and capable mechanic, afterward developed a pattern of his own, less complex and better adapted for spinning wool.

Truly yours, WM. B. WEEDEN.

the way from one to seventy sets of cards, and from 240 to 25,000 spindles. One set of cards will supply an average of four broad looms.

The frame spinning of worsted yarn is the same in the United States as in Great Britain, and is chiefly done on frames of English manufacture.

LOOMS.

Table 4 also contains the details of looms in operation during the census year. The total number of looms was 69,807, as compared with 59,261 in 1880, an increase of 17.80 per cent, a smaller percentage of increase than is shown in other machinery, with the exception of cards, because looms are not employed in the hosiery and knit-goods branch. Moreover there has been a large increase in the productive capacity of the modern loom as compared with other mill mechanism. There were found in operation in 1890 but 3,076 hand looms, as contrasted with 4,776 in 1880. In woolen and worsted mills, these hand looms were employed chiefly as pattern looms, and were only occasionally in operation. The remainder were in carpet mills, where the ingrain hand looms numbered 631, with 4,214 power looms, while the Venetian hand looms numbered 157, with 109 power looms.

The change from narrow to broad looms has been going on very rapidly. We had in 1890, 20,848 broad looms on woolen goods, and in 1880, 15,188. In 1890 there were 17,653 narrow looms on woolen goods, as compared with 17,733 in 1880. Practically the number of narrow looms remained the same, while the number of broad looms increased about 37 per cent. In worsted goods the change is not so marked, for the reason that ladies' dress goods continue to be made as a rule in the narrow widths. The broad looms employed on worsted goods in 1890 numbered 8,482, as compared with 2,612 in 1880, and the narrow looms numbered 11,447, as compared with 9,073 in 1880.

Very few narrow looms have been made for men's-wear weaving for twenty years past, and it is a safe statement that the number reported as still existing in woolen mills have been in operation for that length of time.

There is no department of the manufacture where the possibilities of greater economy of production are so marked as in the American weave rooms, a fact attested by the statistics given above. Many mills are filled with old looms which are incapable of successful competition with the splendid machines, with their stop motions, power pick-finding devices, etc., now turned out by the American loom manufacturers. Up to 1857, broad looms were run at about 45 picks per minute. In that year appeared a Crompton fancy loom, with 24 harness capacity, and 3 shuttle boxes at each end, operating at a speed of 85 picks per minute. This was a great stride in production, and no advance has since been so great. Other improvements since introduced by the Knowles Loom Works and the Cromptons have made it possible to speed broad looms up to 90 and 95 picks per minute, and in some instances to 100 and 105 picks. The various devices for facilitating production enable a larger production to be had from the looms now manufactured than the difference in speed alone would indicate, and some manufacturers estimate the gain in production as equal to 100 per cent in the last thirty years.

Looms of American pattern and improvement are now very largely used in England, and their superiority to the looms of other countries is conceded. These improvements have resulted in a greater regularity in the product, less waste of material, and greater saving of labor; one weaver in the lighter fabrics easily attending to two and even four looms. The power loom is worked without muscular effort; dexterity in the repairing of broken yarns being the chief requirement of the operative; consequently, women have largely superseded men in its operation.

The loom completes the category of machinery employed in the wool manufacture proper, so far as the census takes cognizance of it. The great variety of machinery employed in the finishing processes of the manufacture bears no relation to the statistical development of the industry, as it varies in every mill according to the peculiarities of the products upon which that mill is employed. It may be said generally of this machinery that very rapid progress has been made in the last twenty years, quite as marked, indeed, as in either of the mechanical departments we have been considering. In the finish of their goods, so that in appearance and "feel" they will compare favorably with goods made abroad, the American manufacturers have been learning very rapidly of late years, impelled thereto by a realization that this is the chief point at which their products have failed in the past in comparison with the wool manufactures of European countries.

THE INCREASE IN EFFICIENCY.

The absence of any uniform unit of measurement makes impossible a scientific and exact statement of the increase in efficiency in modern machinery. Another obstacle to such a comparison grows out of the irregular introduction of improved machinery. Writing on this subject to Special Agent Joseph D. Weeks, of the Tenth Census, in connection with his report on the statistics of wages for that census, Mr. George William Bond said:

> The progress of mechanical improvements has been continuous, and those establishments only have been really successful which have had the courage to abandon their old machinery as fast as improved forms have proved to be of real importance. Much of this rejected machinery has been sold to factories in distant parts of the country which were pioneers in the wool manufacture in their respective localities, and it is this that has caused many of the failures in such attempts.

The efficiency of labor has not perceptibly increased as a consequence of the increased efficiency of machinery. The tendency has rather been the other way, the improvements in spinning and weaving machinery particularly making it possible to substitute female labor for that of men. This labor is constantly shifting and changing, a tendency which operates to prevent any marked advance in its general efficiency.

Neither has the improved machinery resulted on the whole in reducing the average wages. So large a portion of the work in the wool manufacture is piecework that the general tendency has been to increase the earning capacity of individuals so employed by permitting a greater increase of product as the result of their labor.

IDLE MACHINERY.

Thus far we have been dealing only with the woolen and worsted machinery in actual operation during the census year. This is the first census that has differentiated the active and the idle machinery of the wool manufacture. The proportion of machinery absolutely idle was 6.95 per cent of the whole number of sets of wool machinery; a larger percentage would be required to indicate the productive capacity of our wool mills in excess of the actual output reported. The present statistics afford no clue to the proportion of machinery which was idle in mills partially in operation. As a matter of fact, this proportion was unusually large in 1889; for during the whole of the census year the wool manufacture labored under a depression to a degree not equaled since 1874.

Many mills, in reporting to the census of 1890, indicated one-fourth or one-third of their machinery capacity as not in operation at the time the report was made. While information of this character was too meager to be tabulated, it was evident that the machinery capacity of the country was equal to a production at least one-fifth greater than the actual product reported, including in this estimate the 7 per cent of machinery absolutely idle.

The total productive capacity of mills is limited by the necessity of changing for seasonable work, in mills making both light and heavy weight goods; by the changes in styles, affecting continuity of output, by extra time permitted in some states and limited or practically forbidden in others, and by other causes which might be adduced, which apply particularly to wool manufacturing. There has been no time since the civil war when the machinery capacity of this industry was not in advance of the normal demand of our people for goods.

The character and location of this idle machinery is shown in Table 16. It will be seen that it represented a capital of $6,100,860, actually invested in lands, buildings, and machinery, and exclusive of all active capital, which may be assumed to have been wiped out of existence to an equal amount, in the case of these 267 establishments which had ceased operations. The greatest number of these idle woolen mills was found in the state of Pennsylvania, where 47 establishments represented inactive plants worth $1,265,460, with 116 sets of cards and 23 combing machines; Massachusetts came next, with 43 establishments, representing plants worth $1,184,110, and New York third, with 36 establishments, representing $899,711 capital tied up in plant. The table does not indicate that this idle machinery was peculiar to any locality, but it was distributed somewhat uniformly throughout the United States, in proportion to the actual investment in the several states.

If any exception is to be made to this rule it is in the case of California, where nearly one-third of the mills in existence were idle during the census year. Twenty years ago the wool manufacture took a firm root on the Pacific coast, and for a time promised to become one of the leading industries of that part of the country, particularly in blankets of such a superior quality, that they met with a large and ready sale in the East. It also aimed to supply the local demand for the cheaper fabrics for men's wear, stimulated thereto by the high rates of freight which prevailed. The census of 1890 shows a considerable decline in the value of the woolen goods manufactured in California. The report on the internal commerce of the United States for 1890, compiled by the chief of the bureau of statistics of the Treasury Department, contains a résumé of the condition of wool manufacture in California, supplied by State Labor Commissioner Tobin, from which we make the following extract:

> The woolen industry of California is at present on the decline, and the outlook is not hopeful. Millions in capital have been invested in the business, but the return was not sufficient to warrant the operation of more than two-thirds of the mills. Various causes are assigned for this condition of affairs; and chief among them are high wages, the high price of coal, and high freight rates. It is true that all classes of manufacture labor under similar disadvantages, but the disparity between the cost of production in California and the expense of turning out the same goods in the east is particularly noticeable in this industry. The result has been that eastern manufacturers undersell the local producers, to the ruination of California trade.

In a general way each of the reasons here assigned for the decline of the wool manufacture in California may be accepted as correct. An examination of the wage tables of this report shows that the prevailing rates of that state are uniformly higher than in the east, while the difference in the cost of fuel is even greater. The condition of the industry in California is only an exaggerated instance of the fact that under the improved methods of the modern factory system the tendency of this industry to concentration has become marked, and that concentration results in certain well-defined advantages, in the direction of cheaper production, which must perpetuate that tendency.

Except in isolated cases, as in California, the idle woolen mills discovered by the Eleventh Census were old mills, whose machinery was antiquated, and whose failure was primarily due to lack of the capital necessary to equip them for competition under modern conditions. It is only a question of time before mills which are employing obsolete machinery, without the capital to renew it, must succumb to the pressure of this competition. The margin of profit has greatly decreased. Conditions are thus establishing themselves radically different from those which governed in this industry during the first seventy-five years of our existence as a nation. In respect to nearly all of these idle establishments, therefore, it may be taken for granted that they were permanently idle, except in the contingency of an entire new machinery outfit. Many of them were located upon valuable water powers, and their rehabilitation is only a question of time. A number of them have already been re-equipped and put into operation since these statistics were gathered.

The statistics of idle mills include no establishments denuded of machinery or converted to other industrial purposes. The eastern and middle states are full of buildings and sites formerly occupied by carding mills, fulling mills, and small woolen mills, which long since ceased to be considered in connection with inquiries of this character.

ALLOWANCE FOR DEPRECIATION.

In the same connection the question of the allowance for repairs and depreciation in buildings and machinery may be considered. The returns under this question presented no uniformity, and nothing approaching a uniform rule exists in the wool manufacture. The conditions governing the industry are so diverse and the methods of manufacturers so different, that it is impossible to establish any average. There are certain large establishments in New England which calculate to renew their entire machinery plant as often as every ten or fifteen years to keep themselves abreast with the most modern conditions of manufacturing. In these cases there was reported an average annual allowance of 10 per cent on the cost of plant, to cover depreciation and renewals. The average allowance reported runs from this figure down to 7 per cent, 5 per cent, 3 per cent, 2 per cent, and 1 per cent. Thus, in the state of Massachusetts, 33 establishments reported their allowance for depreciation and renewals of buildings and machinery at 2½ per cent or less, 33 reported their allowance at 5 per cent or less, 20 at 7½ per cent or less, 18 at 10 per cent or less, 4 at 12 per cent or less, and 4 at 15 per cent or more. In most of these cases the actual sum expended for new equipment during the census year was stated. Only 112 of the 336 Massachusetts establishments reporting made any return to this question, and in many mills the item does not figure in the bookkeeping. There are plenty of mills where the method is to run the machinery just as long as it will hold together. This fact is brought out in the annual report of the chief of the Massachusetts Bureau of Labor Statistics for 1890, in which the average cost of new equipment as returned to him by 141 woolen mills was 0.46 per cent, and by 17 worsted mills 0.98 per cent. These low figures could only have been obtained in consequence of the failure of a considerable proportion of the establishments reporting to make any allowance whatever for this item.

The machinery and processes of the wool manufacture are so different from those of cotton, and so complicated and numerous in comparison, that it is impossible to establish any standard, as may be done in that industry, upon which to predicate an average allowance for depreciation. But certain general principles govern the case, which will readily be admitted. The tenure of life of machinery is limited, no matter how well it may be kept in repair. In addition to the regular wear and tear, there is supersession by improvements, which is of far greater consequence, but which can not always be anticipated and which follows no fixed rule. Allowance must be made for it in considering the cost of carrying on the manufacture, and this allowance must be made even where the manufacturers themselves do not make it, if the theory is that the industry is to be carried on in the highest state of efficiency.

The average life of the entire mechanical equipment of a woolen mill is commonly estimated at twenty years, but some machines require to be replaced much more frequently than others. A set of woolen cards may last forty or fifty years with good care, but the clothing on them must be renewed every five or six years. Looms sometimes last thirty years, but their average life is less than twenty, while twenty years will represent the average life of a spinning mule. The various processes involved in the manufacture of all grades of the best woolen goods number between thirty and forty, and nearly every one of these processes requires the employment of one or more separate machines, which are subject to constant change by reason of improvements.

POWER.

The increase in the efficiency of power used in the wool manufacture has been very marked in the decade. This is shown by the following table, in which is given the total horse power, steam and water, in each branch of the industry, at each census, the average number of employés and the amount of horse power per employé. The greatest increase in power is shown to have occurred in worsted mills.

POWER AND LABOR: 1890 AND 1880.

INDUSTRIES.	Year.	Total horse power.	Average number of employés.	Horse power per employé.
Woolen goods	1890	122,224	79,351	1.54
	1880	106,507	86,504	1.23
Worsted goods	1890	49,117	43,593	1.13
	1880	16,437	18,803	0.87
Carpets	1890	22,677	29,121	0.78
	1880	10,401	20,371	0.51
Felt goods	1890	5,051	2,266	2.23
	1880	2,631	1,524	1.73
Wool hats	1890	3,295	3,592	0.92
	1880	3,992	5,470	0.73
Hosiery and knit goods	1890	34,368	61,209	0.56
	1880	11,561	28,885	0.40

Electric and other power, except steam and water, is excluded from the above table, because so large a portion of it is used for lighting. The use of electricity for power has not yet become marked. The increased use of steam, as compared with water, is the distinguishing feature of the statistics of power.

RAW MATERIALS OF THE MANUFACTURE.

WOOL CONSUMPTION.

The consumption of wool in the census year (exclusive of foreign yarns, mohair, alpaca, and other hairs) was 372,797,413 pounds, "in condition purchased", as contrasted with 296,192,229 pounds in 1880, an increase of 25.86 per cent.

It is impossible to ascertain the exact number of pounds of raw wool consumed in the industry, because it is purchased in the greasy state, in the washed state, and in the scoured state, and the figures above given represent purchases in all of these conditions.

The bulk of the domestic wools are now marketed in the greasy state. The quantity sent forward washed becomes smaller each year, and is confined largely to the clip of the middle states. The quantity of scoured wool purchased by the manufacturers is increasing steadily, as wool-scouring establishments, a comparatively new branch of the industry, increase in number and capacity. In his report of the wool manufacture for 1880, Mr. Bond said with reference to this fact: "It is estimated that from 10,000,000 to 15,000,000 pounds should be added to the domestic wool reported, and from 2,000,000 to 3,000,000 pounds to the foreign, to reach the true consumption". The habit of buying scoured wool has become more general during the last ten years, and the present special agent estimates the allowance now necessary in both domestic and foreign at 25,000,000 pounds, in order to reach the true consumption of wool as it originally came to market.

For the year 1889 the Agricultural Department places the clip at 265,000,000 pounds in the grease, including pulled wool, while the census shows that for the nearest corresponding year the wool manufacture consumed 258,680,801 pounds of domestic wool, in all conditions, a difference of but 6,319,199 pounds, which difference is not equal to one-quarter of the shrinkage represented in the washed and scoured wool purchased by the manufacturers.

Allowance must also be made for the quantity of wool annually grown which never reaches the markets, but is consumed in the household.

Again, of the mills reported as idle during the census year, a number were in operation during a portion of that year, but it was impossible to obtain any data of their operations during that limited period. They must have consumed several million pounds of domestic wool.

FOREIGN WOOL CONSUMED.

The consumption of foreign wool of all descriptions (exclusive of imported yarns) appears as 114,116,612 pounds in 1890 as compared with 73,200,698 pounds in 1880, an increase of 40,915,914 pounds, or 55.90 per cent.

The general accuracy of the census returns is attested by the statistics of the imports of foreign wool, shown in the following table, prepared by the Bureau of Statistics of the Treasury Department, which gives the imports of wool since 1870, compared with the domestic clip, and the percentage of foreign wool entered for consumption as compared with the domestic clip:

WOOL PRODUCED AND IMPORTED, DOMESTIC EXPORTS AND ANNUAL SUPPLY OF THE UNITED STATES, 1870-1890.

YEARS.	Domestic production, Department of Agriculture. (Pounds.)	Imports entered for consumption year ending June 30. (Pounds.)	Total production and imports. (Pounds.)	Domestic exports year ending June 30. (Pounds.)	Net supply. (Pounds.)	Per cent of imports to supply.
1870	162,000,000	38,634,067	200,634,067	152,892	200,481,175	19.27
1871	160,000,000	50,174,056	210,174,056	25,195	210,148,861	23.88
1872	150,000,000	94,315,933	244,315,933	140,515	244,175,418	38.63
1873	158,000,000	84,212,582	242,212,582	75,129	242,137,453	34.78
1874	170,000,000	56,793,737	226,793,737	319,600	226,474,137	25.08
1875	181,000,000	51,686,294	232,686,294	178,034	232,508,260	22.23
1876	192,000,000	40,275,678	232,275,678	104,768	232,170,910	17.35
1877	200,000,000	40,114,394	240,114,394	79,599	240,034,795	16.71
1878	208,250,000	39,801,161	248,051,161	347,854	247,703,307	16.07
1879	211,000,000	40,102,642	251,102,642	60,784	251,041,858	15.97
1880	232,500,000	99,372,440	331,872,440	191,551	331,680,889	29.9C
1881	240,000,000	67,416,967	307,416,967	71,455	307,345,512	21.94
1882	272,000,000	63,016,769	335,016,769	116,179	334,900,590	18.80
1883	290,000,000	53,049,967	343,049,967	64,474	342,985,493	15.47
1884	300,000,000	87,703,931	387,703,931	10,393	387,693,538	22.62
1885	308,000,000	68,146,652	376,146,652	88,006	376,058,646	18.12
1886	302,000,000	107,910,549	409,910,549	146,423	409,764,126	26.33
1887	285,000,000	114,404,173	399,404,173	257,940	399,146,233	28.66
1888	269,000,000	97,231,267	366,231,267	22,164	366,209,103	26.55
1889	265,000,000	126,181,273	391,181,273	141,576	391,039,697	32.27
1890	276,000,000	109,902,105	385,902,105	231,042	385,671,063	28.50

The degree of our dependence upon a foreign wool supply is accurately ascertained from the year 1821. Prior to that time the records of the Treasury Department were not kept in a manner that permitted any definite statement regarding it. In American State Papers, Class IV, Commerce and Navigation, volume 11, appears a special report of the Secretary of the Treasury in response to a resolution of the House of Representatives, asking for a report "showing the quantity of wool imported into the United States during the years 1817, 1818, 1819, 1820, and the first three-quarters of 1821". The Secretary submitted what data he could furnish, but added that the statements were necessarily imperfect, because the duty being ad valorem, no record of weight was preserved in the custom houses. Then appear the following figures:

	ANGORA, CAMEL'S, VICUNA, ETC., FREE.		SHEEP'S WOOL (15 PER CENT).	
Years.	Pounds.	Value.	Pounds.	Value.
1817	6,600	$6,189	2,272	$1,883
1818	1,500	226	.....	.....
1819	1,700	1,407	1,192	479
1820	.....	.....	106,788	24,965
1821 (three-quarters)	2,622	2,250	384,333	93,829

After the year 1821 the record is complete, and is much more accurate than any data we possess regarding the domestic clip. The following table shows the quantity and value of all foreign wool entered for consumption from 1822 to 1890, inclusive:

IMPORTS OF FOREIGN WOOL, 1822 TO 1890 (*a*).

YEARS.	Quantity (fiscal year). (Pounds.)	Value.	Quantity (5-year periods). (Pounds.)	Value.	Quantity (10-year periods). (Pounds.)	Value.	INCREASE IN QUANTITY AND IN PER CENT. (POUNDS.)	
							5 years.	10 years.
1822	1,715,690	$387,312	6,736,205	$1,633,704	.....	.....	.....	.....
1823	1,673,348	340,956						
1824	1,291,400	353,367						
1825	2,055,767	552,069						
1826	2,622,909	446,768	10,200,102	1,612,260	16,936,307	$3,245,964	3,463,897 51.42 per cent.	.....
1827	3,180,767	379,841						
1828	2,437,018	488,831						
1829	1,295,767	204,648						
1830	663,641	92,172						
1831	5,619,353	1,287,540	15,904,169	2,955,115	.....	.....	5,704,067 55.92 per cent.	.....
1832	2,814,879	501,392						
1833	273,631	93,957						
1834 (*b*)	.....	.....						
1835	7,196,306	1,072,116						
1836	12,296,249	1,203,037	46,961,106	4,001,900	62,865,275	6,957,615	31,056,937 195.28 per cent.	45,928,908 271.19 per cent.
1837	10,259,087	806,544						
1838	6,785,704	509,283						
1839	7,806,254	662,306						
1840	9,813,212	819,830						
1841	14,862,984	1,047,507	67,113,232	4,548,590	.....	.....	20,152,126 42.91 per cent.	.....
1842 (*c*)	10,849,773	716,768						
1843	3,497,447	228,106						
1844	14,077,956	872,143						
1845	23,825,072	1,684,066						
1846	16,504,879	1,112,978	72,651,360	5,361,468	139,764,592	9,910,058	5,538,128 8.25 per cent.	76,899,317 122.32 per cent.
1847	8,249,207	524,874						
1848	11,379,483	862,675						
1849	17,822,497	1,170,561						
1850	18,695,294	1,690,380						
1851	32,578,193	3,836,613	110,198,202	13,165,013	.....	.....	37,546,842 51.68 per cent.	.....
1852	17,992,646	1,876,536						
1853	21,403,925	2,625,761						
1854	20,033,492	2,792,558						
1855	18,189,948	2,032,545						
1856	16,729,377	2,172,477	119,908,085	18,690,041	230,106,287	31,855,054	9,709,883 8.81 per cent.	90,341,695 64.64 per cent.
1857	18,460,227	2,612,794						
1858	25,562,478	3,523,595						
1859	33,030,112	5,084,562						
1860	26,125,891	5,296,702						
1861	31,638,533	5,015,002	284,517,282	48,466,353	.....	.....	164,609,197 137.28 per cent.	.....
1862	43,698,138	7,140,114						
1863	74,412,878	12,528,606						
1864	91,026,630	16,128,209						
1865	43,741,094	7,654,422						
1866	70,435,943	10,682,257	206,032,175	31,098,856	490,549,457	79,565,209	78,485,107 d27.59 per cent.	260,443,170 113.18 per cent.
1867	37,683,675	5,779,511						
1868	24,582,551	3,955,671						
1869	34,695,939	5,251,094						
1870	38,634,067	5,430,323						

a The quantities and values given are for net imports, 1822 to 1866, inclusive, and imports entered for consumption from 1867 to 1890, inclusive.
b In 1834 the exports of foreign wool exceeded the imports.
c To and including the year 1842, the fiscal year ended September 30; after that date June 30.
d Decrease.

IMPORTS OF FOREIGN WOOL, 1822 TO 1890—Continued.

YEARS.	Quantity (fiscal year). (Pounds.)	Value.	Quantity (5-year periods). (Pounds.)	Value.	Quantity (10-year periods). (Pounds.)	Value.	INCREASE IN QUANTITY AND IN PER CENT. (POUNDS.) 5 years.	10 years.
1871	50,174,056	$7,704,674						
1872	94,315,933	19,571,559						
1873	84,212,582	20,466,166	337,182,602	$69,582,888			131,150,427	
1874	56,703,737	11,611,867					63.66 per cent.	
1875	51,686,294	10,228,622						
1876	40,275,678	7,887,616						
1877	40,114,394	7,012,972						
1878	39,801,161	6,995,367	259,666,315	45,326,434	596,848,917	$114,909,322	77,516,287	106,299,460
1879	40,102,642	5,516,813					a22.99 per cent.	21.67 per cent.
1880	99,372,440	17,913,066						
1881	67,416,967	12,060,827						
1882	63,016,769	10,333,359						
1883	53,049,967	8,491,988	339,334,286	53,953,737			79,667,971	
1884	87,703,931	13,593,299					30.68 per cent.	
1885	68,146,652	9,474,264						
1886	107,910,549	13,794,213						
1887	114,404,173	16,351,370						
1888	97,231,267	14,062,100	555,620,367	77,805,485	894,963,653	131,759,222	216,295,081	298,114,736
1889	126,181,273	17,432,759					63.74 per cent.	49.95 per cent.
1890	109,902,105	16,165,043						

a Decrease.

The table shows the quantity imported by five and by ten year periods, and also the increase in quantity and the per cent of increase for both the five-year and ten-year periods over the previous periods. These percentages show remarkable fluctuations. The most rapid rate of increase in the use of foreign wool occurred in the decade ending 1840; the next greatest rate of increase occurred in the decade ending 1850, and the third in the decade ending1870. The percentage of increase in the decades ending 1880 and 1890 was small in comparison with those named.

The percentage of foreign wool entered for consumption in 1890 on the basis of net supply as estimated in the statement on page 29 is 28.50 per cent, and the average per cent for the whole series of years covered by the table is 24.06 per cent. This percentage indicates the degree to which we have succeeded in supplying the wants of the domestic manufacture from home-grown wool. But this is not a fair basis for such a comparison, inasmuch as the great bulk of our imports of wool are of class 3, called carpet wools, because used almost exclusively in the carpet manufacture and not grown, nor attempted to be grown, to any extent in the United States. The government classification of imported wools according to their blood has only been made since 1867, in which year the blood classification first appeared in the tariff. The figures for each subsequent year are as follows:

WOOLS ENTERED FOR CONSUMPTION IN THE UNITED STATES, 1867–1890, BY CLASS, QUANTITY, AND VALUE.

YEARS.	Total pounds.	NO. 1.—CLOTHING. Pounds.	Value.	NO. 2.—COMBING. Pounds.	Value.	NO. 3.—CARPET WOOLS. Pounds.	Value.
1867	37,683,675	1,270,356	$415,609	150,302	$31,827	36,263,017	$5,332,074
1868	24,582,551	4,681,679	918,588	1,804,272	332,315	18,096,600	2,704,768
1869	34,695,940	2,512,202	505,715	4,533,367	1,092,297	27,650,371	3,653,082
1870	38,634,067	6,530,493	1,249,152	2,752,569	765,147	29,351,005	3,416,924
1871	50,174,056	5,957,461	1,201,201	17,665,600	3,167,335	26,550,995	3,335,638
1872	94,315,933	16,871,332	4,183,960	41,155,460	8,952,131	36,289,141	6,435,468
1873	84,212,582	6,029,488	1,744,200	49,540,231	12,723,501	28,642,863	5,998,465
1874	56,703,737	2,308,210	815,307	27,087,437	6,193,150	27,308,090	4,603,410
1875	51,686,294	13,117,679	3,602,535	7,769,157	2,153,261	30,799,458	4,472,826
1876	40,275,678	8,643,366	2,187,713	3,167,307	1,153,504	28,465,005	4,546,398
1877	40,114,394	9,294,029	2,202,639	2,509,954	830,715	28,310,411	3,979,617
1878	39,801,161	9,916,012	2,431,043	3,028,869	969,083	26,856,280	3,594,640
1879	40,102,642	5,229,987	1,114,301	1,709,601	413,761	33,163,054	3,988,752
1880	99,372,440	26,785,172	6,412,273	13,266,856	3,801,730	59,320,412	7,699,063
1881	67,416,967	20,699,707	4,751,454	4,421,491	1,271,332	42,385,769	6,038,041
1882	63,016,769	13,489,923	3,042,407	2,318,671	648,252	47,208,175	6,642,699
1883	53,049,967	11,546,530	2,507,443	1,373,114	343,987	40,130,323	5,580,558
1884	87,703,931	20,703,843	4,700,605	4,474,396	1,058,758	62,525,692	7,833,936
1885	68,146,652	13,472,432	2,994,533	3,891,914	921,252	50,782,306	5,558,479
1886	107,910,549	23,321,759	4,344,189	4,872,739	1,106,116	79,716,051	8,343,998
1887	114,404,173	23,195,734	4,339,498	9,703,962	2,270,058	81,504,477	9,741,814
1888	97,231,267	16,952,513	3,648,780	5,568,068	1,322,862	74,710,686	9,090,459
1889	126,181,273	22,973,088	4,764,015	6,651,719	1,556,309	96,556,466	11,112,435
1890	109,902,105	21,387,867	4,856,640	7,662,978	1,895,535	80,851,260	9,412,866

The tables show that, exclusive of carpet wools, the needs of our manufacturers have been met by the domestic clip, for the last twenty-four years, within about 23 per cent of their total consumption. This deficiency in the domestic supply consists almost wholly of qualities of the fiber which are not grown advantageously in this country.

The question of the quantity of imported carpet wools which enter into wool manufactures other than carpets may be approximately answered by these returns, but only approximately, as the imports of no fiscal year can be taken as the exact measure of the consumption of that year.

The third class wools imported were 74,710,686 pounds in 1888, 96,556,466 pounds in 1889, and 80,851,260 pounds in 1890. Undoubtedly some of the imports of each of these years are represented in the consumption of the census year, and the average of these years, which is 84,000,000 pounds, may be taken as the equivalent of the consumption of third class wools in the census year, leaving nearly 30,000,000 pounds as the consumption of first and second class wools.

The exact part of this 84,000,000 pounds of carpet wool consumed by the carpet manufacture can not be ascertained, for the reason that many carpet mills buy their yarns from yarn manufacturers, many of whom make other products, and it is impossible therefore to trace the exact disposal of the foreign wool they consumed.

The carpet manufacture spun 54,742,234 pounds of foreign wool, and used in addition 18,763,201 pounds of woolen yarn and 10,555,799 pounds of worsted yarn in the census year. The latter was made almost wholly from foreign wool, and estimating two pounds of wool to a pound of yarn, it stands for 21,111,598 pounds of wool, thus bringing the consumption of third-class wool in the carpet manufacture up to 75,853,832 pounds, or within about 8,000,000 pounds of the total consumption of this class of wool in the census year.

There was but little foreign wool used in the manufacture of the 18,763,201 pounds of woolen yarns purchased by the carpet mills. These were mostly low-grade yarns, used in cheap carpets, and in their manufacture was consumed a large portion of the shoddy, hair, and cotton consumed in the woolen mills.

The sources of the supply of carpet wools used in the American mills are shown by the following statement from the Bureau of Statistics of the Treasury Department for the year ending June 30, 1890:

QUANTITY OF WOOL OF CLASS 3 IMPORTED AT THE THREE PRINCIPAL PORTS INTO THE UNITED STATES DURING THE YEAR ENDING JUNE 30, 1890, SHOWING COUNTRY OF PRODUCTION. (a)

	POUNDS.
Total	80,152,484
Argentine Republic	13,531,096
Austria-Hungary	11,977
Brazil	175,697
Chili	1,634,953
China	8,704,983
Danish West Indies	357
Greenland, Iceland, etc	64,104
Ecuador	1,087
France	2,198,996
Germany	718,572
England	5,193,817
Scotland	5,144,822
British West Indies	32,793
British East Indies	6,635,751
East Indies (not specified)	1,295,723
British possessions in Australasia	21,237
Italy	444
Dutch West Indies	14,984
Portugal	339,956
Russia on Baltic and White sea	3,397,982
Russia on Black sea	10,594,887
Russia, Asiatic	204,339
Russia (not specified)	1,362,293
Servia	28,381
Spain	32,837
Switzerland	35,685
Turkey in Europe	1,733,619
Turkey in Asia	12,474,352
Turkey in Africa	154,826
Turkey (not specified)	94,023
Uruguay	84,569
Asia, all other	3,969,331
Country not specified	264,011

a This and the following table represent imports at the three principal ports of entry only, and the total imports of Class 1 and Class 3 accordingly differ from the totals for these classes given in the table at the foot of page 31.

The imports of merino wools (Class 1 of the tariff classification) have been quite steadily increasing of late years, and the average imports since the earlier years under the tariff of 1867 have been very large. The imports of combing wools show remarkable fluctuations during the earlier years of the period, but latterly they show no tendency to increase. These imports, which consist mainly of the English combing wools, have fallen off in consequence of the perfecting of the combing machine, which permits the combing of the shorter stapled merino wools in the worsted manufacture, with better results, except in special fabrics, than can be obtained from the long English combing wools.

Of the Class I wools imported and used by our manufacturers the great bulk, 77 per cent, are of Australasian production, as is shown by the table following, compiled from the Treasury reports, which gives the quantities of Class I wools imported, directly or indirectly, from each foreign country during the fiscal year 1889–1890.

QUANTITY OF CLOTHING WOOL IMPORTED AT THE THREE PRINCIPAL PORTS INTO THE UNITED STATES DURING THE YEAR ENDING JUNE 30, 1890, SHOWING COUNTRY OF PRODUCTION.

	POUNDS.
Total	15,492,107
Australasia	11,928,921
Europe	1,271,510
England	884,807
France	262,333
Spain	91,460
Turkey	24,868
Germany	7,199
Scotland	509
Russia	334
South America	1,166,890
Chile	783,575
South America—Continued.	POUNDS.
Argentine Republic	168,355
Uruguay	144,239
Brazil	67,981
Peru	2,740
Africa	1,105,730
British possessions	1,102,793
All others	2,937
Asia	18,056
China	10,456
Turkey	3,800
All others	3,800
West Indies	1,000

The development of wool production in the United States, while it has been on the whole rather rapid, has not been comparable with that which has been simultaneously occurring in Australasia, South America, and the Cape colonies, and has undoubtedly been somewhat retarded by the effect of the increase in these countries upon the prices of wool everywhere.

Marked and important changes have occurred in the general characteristics of our domestic supply. The rapid increase in the supply of what are known as the "territorial" wools, grown west of the Mississippi river, generally upon ranches, somewhat after the methods pursued in Australia, has had a tendency to check the increase in the clip of the finer wools that have so long been the peculiar product and glory of the middle western states. Of the staple wools now produced in the United States, we have eminent authority for saying that they "are better adapted to the fabrication of satisfactory clothing for the American people than any other wools grown". All goods which require the medium wool are admirably supplied by domestic fleeces, which are nowhere surpassed for uniform, sound, and healthy fiber. Of the superfine wools the domestic flocks now supply little to the domestic manufacture. That these wools can be grown in certain sections of this country has been amply demonstrated, as in the superfine wools of Saxon blood which formerly brought such high reputation to Washington county, Pennsylvania. That they will not be grown, in commercial quantities, is evident from the fact that these sheep are small sized, small fleeced, and comparatively unproductive, and their fleeces can not now command prices which will render them a profitable branch of sheep husbandry. The supply of fine wools of the XX and XXX grades, for which the flocks of Ohio, Michigan, and Pennsylvania have been noted, is falling steadily behind the demand, and it is to supply this deficiency that the increasing importations of Australian wools are due. The fineness, length, and soundness of staple in these Australian wools, together with their remarkable freedom from grease, render them admirable for admixture, where high-grade goods are to be manufactured. In such goods the domestic fleece is relied upon for strength and durability, and the Australian for fineness, brightness, and beauty of finish. In the somewhat circumscribed area covering a few counties in southeastern Ohio, and contiguous sections of Pennsylvania and West Virginia, a limited number of sheep may still be found producing a wool from which goods may be made fully equal in every respect to those manufactured wholly or in part from Australian fleeces.

The specific qualities of wool which enter into the manufacture of the fabrics now chiefly made in the United States were indicated by the late John L. Hayes, in 1872, in a paper prepared for the Department of Agriculture, as follows:

> Common flannels involve a very important consumption of wools, from the coarsest common or native to medium merino wools; opera flannels, from fine to very finest wools; blankets, from the most ordinary Mexican to noils (the shorter or refuse fibers obtained by the process of combing the best combing wools), up to the medium merino wools; also the shorter wools of English blood, such as the down and cheviot wools. Shawls, the principal varieties, embrace all grades of merino wool up to pick-lock; some special varieties being composed of worsted combing wools; felts, generally the lowest grades of wools, but some varieties of felting, such as piano and table covers, medium merino wool. Knit goods, such as knit shirts, vests, skirts, drawers, cardigans, hose, involve a very important consumption of wool, from the lowest to high grades of merino, certain fancy varieties, composed of worsted yarns, requiring English combing wools. Fancy cassimeres, occupying a prominent place in the list of fabrics, require all grades of merino wool, without burr, principally medium; overcoatings, such as beavers, moscows, eskimos, medium to finest grades of merino wool. For all mixtures of wool with shoddy, the best and the longest merino wools are now regarded as the most profitable, for the reason that they "carry" more of the short fiber of the wool substitute. Thin wool coatings require from medium to the finest merino wools, fancy ladies' cloakings, the finest long merino wools, and, in some varieties, mohair, or the wool of the Angora goat; gentlemen's worsted coatings, the finest long merino combing wools. For certain varieties of delaines, coburgs, and cashmeres, ladies' dress goods, with cotton warp, medium long merino wools are used; for Caledonia ladies' cloakings, a limited use is made of mixtures of fine, long combing wools and English or Canada combing wools; for serges, moreens, alpacas, Italian cloth for linings, mohair lusters, lastings, damask for furniture,

for furniture covering, curtains and table cloths, reps for furniture and curtains, webbing for reins and girths for horses and for suspenders, bunting for flags, military sashes, picture cords and tassels, clouds or nubias, Ristoria shawls, braids and bindings, long English combing or Canada wools are required; for the warp of ingrain 2 and 3 ply carpets, the long carpet wools of Cordova and Chile, unsuited by their coarseness and unequal diameter for dress goods, are employed, the short wools for filling, and for the cheaper carpets the short and coarse Mexican and Texan wools; for Brussels and tapestry, and Brussels and velvet carpets, the long Cordova and Chile carpet wools are used for the colored yarns, the warp being of linen; for the whites or very light shades, the best English or Canada combing wools.

Returning to the consideration of the total quantity of wool consumed in the wool manufacture, we have to bear in mind that camel's hair, mohair, and alpaca are regarded in the trade as the equivalents, the first of Class 3, or carpet wools, and the others of superior grades of Class 2, or combing wools. The quantity of camel's hair and noils consumed has increased from 1,583,119 pounds in 1880 to 7,684,804 pounds in 1890, and of mohair and noils from 159,678 pounds in 1880 to 2,136,244 pounds in 1890. The alpaca has been lost in the "hair of other animals", which is in the main an adulterant, and the consumption of which has increased from 6,335,169 pounds to 16,865,764 pounds.

The tables presented take no cognizance of the quantity of wool contained in the imported yarns consumed by American manufacturers, the value of which is included in the amounts reported under the head "All other materials". The quantity of woolen and worsted yarn entered for consumption in the fiscal year ending June 30, 1890 was 3,229,777.83 pounds, valued at $1,844,849.15, foreign value, an average of 57.12 cents per pound, and may be accounted the equivalent of 9,000,000 pounds of greasy wool.

Adding these items and the 373,000,000 pounds of foreign and domestic wool in condition purchased shown in the tables, together with the 25,000,000 pounds estimated by the special agent as the allowance for the scoured wool purchased, we have an approximate consumption of 434,000,000 pounds of wool in the grease. Similar additions would need to be made to the consumption reported in 1880 to institute an exact comparison and percentage of increase.

We are thus enabled to ascertain with some degree of certainty the per capita consumption of wool in the United States for a series of decades, as shown by census statistics, and by the Treasury returns of the imports of woolen goods. In estimating the amount of raw wool contained in the latter, it is customary to calculate three pounds of wool to each dollar in value of woolen goods. On this basis we make the following table:

COMPARATIVE CONSUMPTION OF WOOL IN THE UNITED STATES.

YEARS.	Imports of wool entered for consumption year ending June 30. (Pounds.) (a)	Home production of wool year ending Jan. 1. (Pounds.)	Domestic exports. (Pounds.)	Net supply. (Pounds.)	Imports of wool manufactures, allowing 3 pounds of wool to the $1 in value. (Pounds.)	Total consumption. (Pounds.)	Per capita consumption of wool. (Pounds.)
1840	b9,813,212	35,802,114	.....	45,615,326	31,095,276	76,710,602	4.49
1850	18,695,294	52,516,969	35,898	71,176,365	58,178,613	129,354,978	5.58
1860	26,125,891	60,264,913	1,055,928	85,334,876	128,497,923	213,832,799	6.80
1870	38,634,067	162,000,000	152,892	200,481,175	105,289,422	305,770,597	7.93
1880	99,372,440	232,500,000	191,551	331,680,889	95,503,641	427,184,530	8.52
1890	109,902,105	276,000,000	231,042	385,671,063	162,496,269	548,167,332	8.75

a Quantities for 1840, 1850, and 1860 are imports less re-exports. b Year ending September 30.

This per capita consumption of wool is larger than that of any other nation on the globe. The manufacturers' consumption of wool in Great Britain is slightly in excess of that in the United States, but when the exports of manufactured wool are deducted, and proper allowance is made for imported manufactures, it is discovered that the domestic consumption of wool in Great Britain is equivalent to about 262,000,000 pounds, which is a per capita consumption of 6.9 pounds. No other country approximates Great Britain and the United States in its per capita wool consumption.

COMPARISON OF THE AMERICAN AND ENGLISH WOOL MANUFACTURE.

The preceding statistics reveal a striking disparity between the consuming capacity of woolen and worsted machinery in the United States and the corresponding capacity in Great Britain. In the latter country, according to the official returns under the "factory and workshop act", there were 6,479,252 spindles (spinning and doubling) at work in the wool manufacture in 1889, consuming, as shown by the statistics of Helmuth Schwartze & Co., 428,000,000 pounds of wool, that being the quantity of foreign and home grown wool retained for consumption in the United Kingdom in that year. This was an average consumption of about 66 pounds of raw wool per spindle. In the United States 2,986,423 woolen and worsted spindles consumed raw wool to the approximate amount, as shown above, of 434,000,000 pounds in the greasy state, an average consumption of 145 pounds per spindle.

These figures are of no value for any scientific purpose, first, because they are based upon the consumption in the grease, and second, because they take no account of the other materials, such as cotton and shoddy, which pass

over the cards and are spun with the wool. They will serve to indicate in a general way the radical difference that exists in the industry as conducted in the United States and in Great Britain.

It is the same difference that appears in the cotton industries of the two countries. It has been shown that the average consumption of cotton per spindle in the United States is more than twice the average spindle consumption in Great Britain. In other words, the identical disparity of consumption, as between the two countries, exists in both the cotton and the wool manufacture. To some degree it is attributable to the same causes in both industries. These causes, as they appear in the wool manufacture, may be summarized as follows:

(1) The bulk of the yarns spun in Great Britain are of finer counts than the bulk of the yarns spun in the United States.

(2) In the United States the woolen manufacture still largely predominates over the worsted manufacture, employing 2,329,099 spindles to 657,324 spindles in the latter. A woolen spindle, from the nature of the yarn, will consume annually at least double the quantity of wool that will be consumed by a worsted spindle. In Great Britain, on the contrary, the worsted manufacture is very nearly as large as the woolen, employing 2,402,922 spinning spindles and 669,328 doubling spindles as compared with 3,107,209 spinning spindles and 299,793 doubling spindles in the woolen manufacture. These statistics of the relative number of spindles employed in the two branches of the industry in the two countries are sufficient in themselves to explain the greater average consumption per spindle in the United States.

(3) The quantity of carpets manufactured in the United States is largely in excess of the British product of carpets, and the much coarser yarn used in this branch of the industry has an important bearing upon the question and further explains the discrepancy.

(4) A fourth cause, to which some weight must be attached, lies in the fact that the domestic wool of the United States is marketed, as a rule, in a more greasy condition than the wool consumed in the British mills. There is much more of actual wool, and less of grease and dirt, in the raw material reported as the consumption of British mills than in that consumed by our own mills. This fact should also be borne in mind in considering the per capita consumption of the people of the two countries as given above.

The above explanations of this discrepancy were submitted by the special agent to Dr. Frederick H. Bowman, of Halifax, England, the well-known expert on wool fibers, and elicited from him the following response:

WEST MOUNT, HALIFAX, September 21, 1891.

S. N. D. NORTH, Esq.,
Special Agent, Eleventh Census:

DEAR SIR: In reply to your favor of the 31st August, I have myself been struck with the same anomaly which you have noticed in regard to the very much larger quantity of wool which is used in the United States in comparison with the number of spindles as compared with the consumption of wool and the number of spindles in Great Britain. I do not think there is any doubt but that the largest portion of this increased consumption arises from the very much coarser counts which are spun on the average in the United States as compared with Great Britain, and also I think in your factories there is more waste made in proportion to the quantity of yarn turned out as compared with this country. I know this is the case very markedly in your cotton mills, and I suppose the same will probably hold good in your woolen factories. When you remember there are very large numbers of mills in this country employing a larger number of spindles, where the counts probably average 60's and upward, you will easily see that a very large number of spindles are required to turn off a very small consumption of wool (and I think the main cause of the discrepancy lies here). Possibly also your statistics may not be quite so reliable as our own, and there is undoubtedly a tendency on the part of many manufacturers to exaggerate the quantity of wool which they use, with the idea of making it appear they have a large consumption off their spindles, and this may also increase the discrepancy. Otherwise, I know of no reasons why, if the same counts are spun, you should not be able to use as small a quantity of the raw material as we do in this country.

Trusting that this reply will be satisfactory,

I remain, yours, truly,

FREDERICK H. BOWMAN.

MOHAIR.

The use of mohair, the hair of the Angora goat, is of recent date and limited extent in the United States. In 1880 the use of but 159,678 pounds was reported. In 1890 the consumption had risen to 2,136,244 pounds, valued at $848,533. These figures are singularly confirmed by the commercial statistics, the McNaughtan Company, of New York, reporting the consumption for 1891 at 2,405,538 pounds and for 1890 at 2,147,019 pounds. Of the total consumption reported for 1890, the McNaughtan Company ascertained that 1,785,173 pounds were of foreign growth and 361,846 pounds domestic. Considerable attention has recently been paid to the cultivation of this fiber in the Pacific states, and the rapid increase in its use by our manufacturers will have a tendency to further stimulate the industry. The native home of the Angora goat is the mountainous districts of Asia Minor, where soil and climate are peculiarly favorable to the growth of the long, strong, and silky fiber of the Angora. The goat has been introduced into the Cape colonies, where, mixed with the native African goat, it produces a fleece which is equal to the native mohair, and large quantities of it are now annually exported to England. Dr. Bowman, the distinguished authority on animal fibers, is of opinion that its cultivation in the United States can be successfully extended in "suitable position".

The increased consumption of this fiber is due to the increased manufacture of plush and upholstery goods and other pile fabrics, velvets, astrakhans, etc., both plain and figured, for which it is now chiefly employed. Prior

to 1880 the use of this fiber had been considerably in excess of the quantity consumed in that year, due to the popularity of the hard finished luster fabrics known as alpacas, mohairs, and brilliantines, the manufacture of which was successfully undertaken by several American mills only to be followed by the complete disuse of these goods and their disappearance from popular favor. The fiber has the aspect, feel, and luster of silk, without its suppleness. It differs materially from wool in the absence of the felting quality, and its consumption for clothing purposes has been and is likely always to be limited. Because of the stiffness of the fiber it is rarely woven alone, the warp being usually of cotton, silk, or wool. Its utilization in the machine manufacture dates only from the year 1835, and the mohair of commerce is nearly all consumed by a comparatively few manufacturers.

CAMEL'S HAIR AND NOILS.

Camel's hair is coming to play an important part in the domestic wool manufacture. The total consumption increased from 1,583,119 pounds in 1880 to 7,684,804 pounds in 1890. It is only recently that camel's hair has been utilized as a textile material for machine manufacture, and up to 1885 its employment was confined chiefly to the mixture with various low stock for backing in beavers and other similar goods, and for press bagging. In that year the Abbot worsted mills, at Graniteville, Massachusetts, began the use of camel's hair as the material for worsted yarns for carpet warp, and they succeeded in making a product so strong and perfect that its introduction followed as quickly as certain difficulties in dyeing were overcome, and the increased use of the material is confined to this product. It is difficult to sort the fine downy undercoat peculiar to camel's hair from the long coarse hair which overlies it, except by the combing process.

ALPACA.

Very little alpaca is now used in the United States, and no attempt has been made to secure a return of it. The alpaca from which this fiber is obtained, is exclusively South American, and is found in the lofty ranges of the Andes, where the llama and vicugna are the most common varieties. It is especially adapted to the use of the cotton warp, and light-weight dress goods so made are among the handsomest fabrics. In the large variety of plush and upholstery goods for which the industry has become noted in this country in very recent years these fibers play an important part, which promises to increase rapidly.

WOOL IN COMBINATION WITH OTHER FIBERS.

Wool is the one textile fiber which can be advantageously used in combination with all other fibers in the manufacture of all classes of goods. It is so used to an extent which is constantly increasing in all countries, and which adds greatly to the difficulty of a proper classification of textile establishments for census purposes. In the dress goods manufacture particularly so large a proportion of the product is made upon cotton warps with a wool or worsted filling that many establishments conduct separate departments for the manufacture of cotton yarn, which is used in the products of their worsted mills. Heretofore the statistics of these cotton departments of worsted mills have been counted as a part of the worsted industry. In the present census the returns of the cotton branch of such mills have been separately secured and they are included in the statistics of the cotton manufacture, the value of the yarns made being transferred to the wool manufacture under the head of cotton yarns purchased in the tables of materials used. The mills whose returns were thus divided between the wool and the cotton manufacture were the Arlington and Pacific, at Lawrence, Massachusetts; the Lorraine Company, at Pawtucket, Rhode Island; the Hamilton Company, at Southbridge, Massachusetts; the New Albany Woolen and Cotton Company, at New Albany, Indiana; the Mississippi Mills, at Wesson, Mississippi, and all mills making simply hosiery yarns for sale to knit goods manufacturers. In no other cases was it found possible to make this separation, and all other mills using wool and cotton together have been counted as woolen mills, and properly, as wool is always the predominating material used, in value if not in quantity.

While all textile mills may be classed according to the fiber used which predominates in value, it is obvious that this classification is open to objection, and that it becomes every year a grouping more difficult to make.

Wool is not mixed with cotton to any extent in goods which are sold as cotton goods, it being a raw material of so much greater value. On the other hand, wool is used in mixture with silk, in goods where the silk effect is retained. The use of silk threads to give brilliancy and effect to patterns is increasing in the manufacture of fine worsteds, as is shown by the employment of 244,306 pounds of silk yarn and 131,529 pounds of spun silk yarn, together valued at $1,986,402. This is the first census to show the silk consumption of the wool manufacture.

Linen is used as a warp thread in certain lines of carpets, but no longer in any species of cloths, although the fabric known as "linsey-woolsey", a wool weft woven upon a linen warp (or a cotton warp) was a staple product of the household industry in the eighteenth century and earlier. The quantity of linen yarn used in the carpet manufacture in 1890 was 10,123,816 pounds, valued at $1,621,293. Jute also appears to a limited extent in the manufacture of carpets, the total number of pounds of jute yarn reported as consumed in the year 1890 being 23,795,444 pounds, valued at $1,709,461.

Some efforts have lately been made to utilize the fiber of the ramie plant, as a suitable mixture with wool, with results that are pronounced favorable; but these efforts have not yet passed beyond the experimental stage.

COTTON IN THE WOOL MANUFACTURE.

The quantity of cotton used in the wool manufacture has increased rapidly. There passed through these mills in 1890 75,428,865 pounds of cotton, valued at $8,568,149, in comparison with 48,000,857 pounds in 1880, valued at $6,233,175. Of the quantity consumed in 1890, however, 32,432,617 pounds were for use in the hosiery and knit goods industry, chiefly in merino or pure cotton stockings and underwear.

Moreover, it will appear from an examination of the summary of goods made, included under the head of "All other products" that a very large percentage of the goods made in woolen mills are purely cotton products, and, if a strict classification were possible, they would be included in the report on cotton manufacture. This is due to the fact that many mills, in their machinery equipment, are both woolen and cotton mills, and are classified as woolen mills because the preponderance of their machinery and the bulk of their products pertain to that industry. In this respect, the wool manufacture differs from the other textile industries, a difference arising primarily out of the fact that wool is a fiber that can be worked to advantage in combination with either or all of the other fibers, and is so worked, to an increasing degree and to increasing public advantage, while cotton is never combined with wool as the predominating fiber in imparting character to the fabric, outside of hosiery and knit goods, and silk only to a comparatively limited degree. The mixed textile so called is chiefly one in which wool predominates or appears to predominate. It is because of this interchangeable use of the fibers that so many woolen mills are equipped with cotton machinery.

It appears from the analysis that products valued in the neighborhood of $3,000,000 were all cotton goods, sold as such, as, for instance, cotton yarns, cottonades, cotton jeans, cotton fire hose, cotton dusters, cotton piece goods, ginghams, cotton shirting, and other similar goods which have only found their way into the products of the wool manufacture from the impossibility of separating the cotton products of a woolen mill from its woolen products, in a census return which must take cognizance of products in connection with all the other items of the schedule of inquiry.

Cotton is used in two forms in the wool manufacture: first, as the cotton warp, and second, in the making of a merino yarn, so called, in which the cotton is mixed with the wool on the carding machine and passes into the slubbing, out of which is spun a yarn for a cheap grade of goods. Undoubtedly the development of machinery has greatly increased the manufacture and consumption of these classes of goods. The quantity made in the census year is shown in Table 4 to have been 250,931,270 square yards, valued at $87,692,047, figures which indicate that it is a means of supplying a cheap grade of goods which possess many of the advantages of woolen cloths, and are a great improvement over the all-cotton goods which were largely worn in the early days of the machine manufacture.

Cotton warp woolen goods are as old as the machine manufacture of wool. The details of the wool manufacture of 1820 show that the woolen mills of that day made an almost equal use of cotton and wool in the fabrication of the cheaper grades of cloths, chiefly satinets and jeans. Its use in lighter goods for women's wear is of comparatively modern origin, and, with the exception of hosiery and knit goods, it is in this branch of the industry that the increased use of cotton has chiefly come. The manufacture of this class of fabrics first began in France, about 1833. The English adopted the manufacture at Bradford in 1834–1835, and have since surpassed all other countries in the quality and quantity of these products. The late John L. Hayes, in the official report on wool fabrics at the Philadelphia Exposition of 1876, writes that

> No event of the century has done more for female comfort and for the industry of wool than the introduction of the cotton warp. Cotton, instead of being the rival, became the most important auxiliary of wool, and has added vastly to its consumption. These fabrics are practically the same as a woolen fabric, being so covered by wool that the presence of cotton can be observed only by the closest inspection. Their cheapness and durability make their introduction an invaluable boon to women of moderate means.

In addition to the cotton used on cards and spindles in woolen mills, there were 83,624,868 pounds of cotton yarns purchased by these mills for the manufacture of the fabrics above described, and for the hosiery and knit-goods manufacture. Only a small proportion of these yarns were consumed in other branches of the industry. The cost of these yarns was $17,985,376, which, added to the $8,568,149, the cost of raw cotton, makes $26,553,525, the value of the cotton and cotton yarns consumed in the wool industry, as against a value of $98,540,484 for the foreign and domestic wool consumed.

SHODDY AND OTHER SUBSTITUTES FOR WOOL.

In treating the raw material of the wool manufacture we come next to the substitutes, so called, which are popularly grouped under the generic name of shoddy, but which are all of them, in the scientific sense, the wastes of the original raw material.

For the first time in a census the shoddy manufacture has been investigated in connection with the wool manufacture, to which it is so intimately related as to render it practically a part of the same industry. In presenting the statistics pains have been taken not to blend them, in order that there might be accurate comparisons instituted between the returns for this and other census years. The census of 1860 was the first

which took cognizance of the shoddy manufacture as a distinct and important industry. The censuses of 1860 and 1870 presented the following statistics of the industry:

GENERAL HEADS.	1860	1870
Number of establishments	30	56
Employés	290	632
Capital	$123,500	$815,950
Wages	$54,124	$198,372
Materials	$227,925	$1,098,603
Products	$402,590	$1,768,592

The volume on manufactures, census of 1880, gave a more detailed statement of the shoddy industry, and the figures there presented are shown in comparison with those of 1890 in the following table:

COMPARATIVE STATEMENT OF SHODDY MANUFACTURE: 1880 AND 1890.

STATES.	Year.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS.			Total wages.	Cost of materials used.	Value of products.
				Males above 16 years.	Females above 15 years.	Children.			
Total for United States	1880	73	$1,165,100	695	496	91	$400,326	$3,366,050	$4,989,615
	1890	94	a3,754,063	1,394	867	38	856,582	6,003,035	7,887,000
Connecticut	1880	8	86,000	93	38	8	35,345	261,200	347,500
	1890	7	395,336	154	18	8	85,816	442,852	648,000
Illinois	1880	2	22,000	16	12	3	12,300	74,500	100,000
	1890	3	110,037	41	73	.....	36,254	103,722	182 110
Maine	1880	1	6,000	4	1	3	1,905	7,200	12,000
	1890	.....	.....	.....	.....	.....	.....	.....	.....
Maryland	1880	1	5,000	5	4	6	3,100	14,150	22,500
	1890	.....	.....	.....	.....	.....	.....	.....	.....
Massachusetts	1880	30	460,500	334	105	32	173,439	1,308,715	2,305,985
	1890	29	902,850	320	106	.....	180,748	1,170,868	1,614,459
New Hampshire	1880	3	17,300	13	8	2	5,700	38,900	49,000
	1890	3	23,000	25	.....	.....	11,683	86,816	111,848
New Jersey	1880	1	35,000	10	5	15	25,000	80,734	137,500
	1890	4	193,225	74	40	4	43,755	301,113	389,040
New York	1880	7	32,700	43	32	3	33,610	321,220	407,590
	1890	12	482,520	150	27	6	77,361	343,012	471,478
Ohio	1880	1	250,000	30	216	.....	40,000	575,000	700,000
	1890	3	744,530	191	485	20	182,700	1,100,480	1,377,500
Pennsylvania	1880	11	186,000	90	40	13	47,441	510,977	655,895
	1890	18	640,382	248	91	.....	151,175	1,205,258	1,633,770
Rhode Island	1880	6	49,600	51	26	6	18,590	137,054	195,045
	1890	10	194,250	143	3	.....	68,014	1,165,235	1,350,792
Vermont	1880	2	15,000	6	9	.....	3,896	37,000	56,000
	1890	.....	.....	.....	.....	.....	.....	.....	.....
All other states	1880	.....	.....	.....	.....	.....	.....	.....	.....
	1890	5	67,933	30	15	.....	19,076	83,679	107,343

a This amount does not include value of "Hired property".

Table 17 presents the statistics for the year 1890 more in detail. Many of the products of these shoddy mills are not shoddy as a raw material for other mills, but finished goods composed chiefly of shoddy. Nor was all the shoddy consumed in the census year produced in the mills which are classified as shoddy mills. The tables show the total production of these latter mills to have been 37,002,054 pounds, while the total consumption of the census year in the wool manufacture was 61,561,619 pounds, an increase of 18.02 per cent over the consumption of 1880. The difference, 24,559,565 pounds, was manufactured in the woolen mills consuming it.

The increase in the manufacture of shoddy, mungo, and similar substitutes, as shown by the tables, both as to quantity and value, has been somewhat in excess of the increase in the wool manufacture proper. This is a natural and expected result, for the reason that the use of these substitutes, with the success which has attended their utilization abroad, has only recently been thoroughly understood by American manufacturers. Shoddy was first successfully employed as a substitute for wool at Batley, in England, about the year 1813; but it was not until 1840 that its manufacture was so perfected that it became a considerable and a distinctly recognized branch of the industry.

In our own country these substitutes are chiefly consumed in the manufacture of yarns for low-grade carpets and knit goods, for horse blankets, and some of the cheaper grades of bed blankets, and also in cheap grades of satinets, cassimeres, and heavy overcoatings. The returns show that of the 61,561,619 pounds used in 1890 51,862,397 pounds were consumed in the woolen mills proper, and of the remainder nearly half, or 4,735,144 pounds, in the hosiery and knit goods mills. An analysis of the returns shows that a very considerable proportion of the 51,862,397 pounds ascribed to the woolen mills was utilized in the manufacture of carpet yarns, and would therefore be credited to that branch of the industry, if the conditions of the investigation permitted the subclassification. When due allowance is made for the increased use of these substitutes in carpets, it is found that the increased use of them in goods designed for wearing apparel has been no greater than the increased consumption of wool for the same purpose. The same remark applies to the increased consumption of cow's hair and other animal hairs which belong in the category of substitutes for wool.

Discussion of the question of the deterioration of the American wool manufacture, by reason of an increasing use of these various substitutes for wool, including cotton, arose in connection with the preliminary publication of these figures. For the purpose of exactly ascertaining the facts the following analyses of the tables have been prepared, showing the percentage of the several materials consumed in the years 1880 and 1890. From this table the statistics of hosiery and knit goods have necessarily been excluded, inasmuch as a large proportion of the products of these mills is purely a cotton product and makes no pretense of being anything else. The increased consumption of cotton in these goods can not therefore be regarded as an increase which displaces an equal amount of wool. The table is as follows:

QUANTITIES AND PERCENTAGES OF SCOURED WOOL OR ITS EQUIVALENTS, AND OF COTTON, SHODDY, ANIMAL HAIR, AND OTHER SO-CALLED ADULTERANTS OF WOOL, USED IN THE MANUFACTURE IN 1890 AND 1880.

MATERIALS.	1890 (Pounds.)	1880 (Pounds.)	1890 (Per cent.)	1880 (Per cent.)
Total	324,259,060	252,474,545	100.00	100.00
Scoured wool, including camels hair and mohair	207,584,746	167,634,157	64.02	66.40
Cotton	42,996,248	27,869,706	13.26	11.04
Shoddy and animal hair not specified	73,678,066	56,970,682	22.72	22.56

It will be seen that the percentage of shoddy and adulterant hairs used in 1890 is almost identical with the percentage used in 1880. The comparison shows an increase of 2.22 per cent in the relative percentage of cotton consumed (exclusive of cotton yarns purchased). This increase is not surprising in view of the great decline in the cost of cotton and the enormous increase in the domestic production of cotton warp dress goods.

In a general sense, it may be said that no substitute for wool is equal to wool itself, and any use of any other material, in the wool manufacture, may therefore be called a deterioration. On the other hand, it is true that a quality of clothing can be manufactured by their use which is warm, serviceable, and attractive in appearance, and is furnished at prices which would be impossible but for the substitutes. The consequence is that since the use of these substitutes came into vogue the masses of the people have been more healthfully and more satisfactorily clothed than formerly. There is not wool enough grown in the world to supply the needs of all the people who are dependent upon it for suitable clothing, and the fact that the per capita consumption of wool in the United States is greater than in any other country may be accepted as demonstrating that our people utilize more than their full quota of the supply. The use of substitutes has permitted wool to partially take the place of cotton to a greater or less degree in many articles of apparel, and to this extent at least it is a distinct gain and advantage. This is particularly the case in stuffs intended for women's wear. More than half the cotton used in the wool manufacture is used for cotton warp threads, in goods having a wool or worsted filling, and this class of goods has largely taken the place of cotton goods, which alone were formerly available for the wear of women of limited means.

Shoddy, in its several varieties, is simply a remanufactured fiber, possessing many of its original advantages, though of course not all of them. The fiber of wool has an extraordinary capacity of endurance. Once used it may be used over and over again, not with all its original virtues, but with its warmth-imparting qualities intact. A large proportion of the shoddy consumed in this country is simply the waste of the original manufacture, saved from the loss which befell it prior to the invention of machinery which renders it fit for spinning. In carding, spinning, and weaving certain fibers become tangled, knotted, separated from the slubbing, top, or yarn, and are thrown off. This new machinery permits this waste product to be spun again. The only point at which this material is deficient, as compared with that from which it has been thrown off, is in length of staple, and this difficulty is easily overcome by admixture with new wool.

The other varieties of shoddy are now produced by powerful machines of comparatively recent date, which pull apart the woolen or worsted rags which are fed upon it and effect a gradual untwisting of the fibers. Mungo, made from hard spun or felted cloth, is necessarily of very short fiber, by reason of the tension required

to pull it apart. Wool extract is manufactured from rags into the composition of which cotton or linen has entered, and from which the vegetable fiber is removed by carbonization, and this is the least valuable variety of these restored fibers. The value of all of them is largely dependent upon the skill with which their subsequent manufacture is conducted. Some varieties of shoddy have a value, both intrinsically and in the market, greater than that of low grades of wool. The average value of the shoddy consumed in 1890, according to the census returns, was 11.26 cents, as against an average value in 1880 of 15.42 cents. The reduction in the cost of shoddy used has therefore been somewhat greater than in the cost of wool, which is not surprising in view of the fact that the machinery for the manufacture of shoddy has been very greatly improved during the past ten years and the knowledge of its proper use greatly advanced.

DYESTUFFS AND CHEMICALS.

A very large item of expenditure in the wool manufacture is that for dyestuffs and chemicals used in the preparation of materials and the finishing of goods. The census of 1880 showed a cost of $7,648,618 for dyestuffs and chemicals, while that for 1890 shows a cost of $6,453,665 exclusive of oils and soap, which are now separately reported but which were included under the general head in 1880. The corresponding total for 1890 is, therefore, $9,146,017. Both oil and soap are important chemical agencies in the manipulation of wool in the preparatory stages of its manufacture. Of oil, 4,243,618 gallons were used, valued at $1,374,049. Much of this oil was consumed for fuel and lubricating machinery, and no distinction is made of the more expensive oils used in the preparatory processes of wool manipulation. Of the 39,290,827 pounds of soap used, value, $1,319,203, the greater portion was employed in the cleansing of material and product.

The dyeing processes for woolen and worsted goods may take place in the clean stock, in the worsted top, in the yarn, or in the piece, according to the characteristics of the fabric to be made. The fancy cassimere, the high-grade carpets, dress goods, and special fabrics of other varieties of goods are made with yarns dyed in conformity with the patterns to be woven; and in large establishments, particularly carpet mills, whose assortment of patterns is extensive, large lines of colored yarns, often over a thousand shades, are kept in stock, considerably increasing the cost of manufacture.

Wool is a better recipient of dyes than either cotton or silk, and in consequence the art of dyeing has greater possibilities in this manufacture than in any other textile industry. These possibilities have been greatly developed since the introduction of the coal-tar dyes, the increased and perfected use of which has been one of the striking advances of the past decade. The most obvious result has been the almost endless multiplication of shades of coloring in all lines of fabrics, many of them of great delicacy, which has added a marvelous variety and picturesqueness to the products of the wool manufacture. The American dyers are becoming very expert in the use of the mineral dyes, and their work now compares very favorably, in the fineness and fastness of colors, with that of their European competitors. The use of the vegetable dyes has greatly diminished during the decade; but many of our best mills still adhere to them, particularly the indigo, for their best effects.

Woolen goods receive and hold colors printed on them more readily than cotton goods, and the proportion among the light fabrics which are printed is large. The figured delaines and many of the figured worsted goods, scarfs, some descriptions of shawls, felt and woolen druggets, and the tapestry carpets, carriage robes, and many of the felt skirtings are printed. The process varies little from that employed in printing silk and cotton goods, the patterns and colors being applied either by blocks or by cylinders.

EMPLOYÉS AND WAGES.

The details of labor employed and wages paid in the wool manufacture are presented with a fullness in this census never before attempted, and are contained in Tables 11–14. These tables permit an accurate subdivision of the relative earnings of all classes, in each branch of the industry, and without the misleading results which follow from averages obtained by grouping all classes, owners and managers, clerks and operatives, skilled and unskilled, pieceworkers and time workers, in any branch.

The average number of employés in the industry during the census year was 219,132, of whom 3,163 were officers and firm members employed in productive labor or in supervision. The total employés were divided into 98,446 males above 16 years of age, 105,993 females above 15 years, and 14,693 children of both sexes. The number of males employed increased 30.46 per cent, the number of females 58.64 per cent, and the number of children decreased 23.81 per cent. The greater percentage of increase in the number of females employed shows the effect of improved machinery upon the personnel of mill operatives. The tendency of these improvements is to lessen the physical exertion required in running the machinery, and thus to increase the efficiency of female labor.

The following table indicates the percentage of men, women, and children employed in the whole industry at the censuses of 1890 and 1880:

EMPLOYÉS.	Years.	Average number of employés.	Per cent of total.
Total	1890	219,132	.....
	1880	161,557	.....
Males	1890	98,446	44.93
	1880	75,459	46.71
Females	1890	105,993	48.37
	1880	66,814	41.35
Children	1890	14,693	6.70
	1880	19,284	11.94

The decrease in the number of children employed is the most striking variation in the statistics of the two censuses. It is to be attributed largely to the enactment of laws in the several states which throw greater restrictions around the employment of children. Of these children 12,948 were employed at weekly rates and 1,745 at piece rates.

By dividing the total number of operatives employed in all branches of the industry into the total amount paid for wages we have an average of $349.84, further differentiated into an average of $461.12 for men, $273.41 for women, and $155.53 for children. In the averages thus obtained are included the salaries of officers and clerks, and also the actual earnings of pieceworkers, which are frequently found to be less than the average earnings of skilled laborers, male and female.

By a similar treatment of the wages and employés reported in 1880, we have an average of $293.33, showing an apparent increase in the average earnings of all employés of 19.26 per cent in the ten years. It is impossible to make separate averages of this description for men, women, and children employed in 1880, because the wages of each class were not then separately reported. While wages have increased in the interval the increase has not been so large as the above percentage would indicate, and we are debarred, for the above reason, from any satisfactory determination of what the actual percentage of increase has been. The much smaller percentage of children now employed affords a partial explanation of the great apparent increase in average earnings. On the other hand, the percentage of men employed has decreased from 46.71 in 1880 to 44.93 in 1890, the increase in the percentage of women employed being from 41.35 to 48.37.

One explanation of the apparently excessive increase in average earnings lies in the fact that the number of officers and clerks employed is much more closely reported in 1890 than was the case in 1880. The number in 1880 was 1,810, or one in every 89 employés. In 1890 the number is 5,273, or one in every 42 employés. The increase in the number of officers and clerks reported is 191.33 per cent, while the increase in all other classes of employés is only 33.87 per cent. If we could separate the salaries paid to officers and clerks in 1880 from the wages of all other operatives, we should be able to ascertain what the actual average increase in the earnings of the latter was. At the same time the number of officers and clerks reported in either year is so small, in comparison with the whole number, as to exert but a trivial influence upon the percentage of average earnings in either case. Neither were the conditions of the industry such in 1890 that the average time employed would be greater in this year.

AVERAGE EARNINGS.

Tables 11 and 12 give the actual average earnings for each class by itself, officers and firm members, clerks and salesmen, operatives and skilled labor, unskilled labor, and finally those employed on piecework, each class divided into males, females, and children, and each class shown both for the United States and for each separate state in each branch of the industry.

These tables are therefore the proper index of average earnings, and the only proper index. They reveal the striking disparities which exist in the wages paid in the different sections of the country, and also in the different branches of the industry. Thus, in Massachusetts, the average weekly earnings of male operatives employed in the carpet manufacture were $9.11, in New Jersey $7.70, in New York $9.58, in Pennsylvania $10.29, and in Connecticut and Rhode Island $9.16. The average earnings of females show the same disparity, running from $4.36 in New Jersey, to $7.61 in Pennsylvania. In woolen mills the average weekly earnings of males of the same class in Massachusetts were $8.63, in Pennsylvania $9.04, while female operatives in Massachusetts averaged to earn $6.42, and in Pennsylvania but $5.98. These variations in the averages are affected by varying conditions, as the varying number of hours actually employed, and are not absolute averages on that account, although they are all calculated on the basis of 50 weeks' employment during the year. Still more striking disparities, known to

be in accord with the facts, appear in the similar averages for western and southern states. Thus Georgia shows average weekly earnings for males of $6.50; of females, $3.55; Indiana, males, $7.77; females, $4.34. These illustrations might be multiplied indefinitely; and each student of the tables may pursue them through all classes, in every branch, and for every state. These general deductions are established by the analysis:

(1) That the carpet manufacture pays the highest average wages to both men and women, followed closely by the worsted manufacture.

(2) That the hosiery and knitting mills pay the lowest average wages of any branch, due to the larger number of females employed.

(3) That wages in the wool manufacture are highest in Pennsylvania.

(4) That of the New England states Maine pays the lowest average wages.

(5) That wages are considerably lower in the south than in the west, and lower in the west than in the eastern and middle states.

These deductions are sustained by another analysis of the tables given below, in which appears the actual average earnings in each of the great manufacturing states, and also in typical western and southern states, of men, women, and children separated from officers and clerks, and also from pieceworkers. It would seem that these analyses present the fairest indication of the actual earnings of the mass of the operatives for the several sections. It must be borne in mind that these are average annual earnings as contrasted with average weekly wages, and represent what was actually paid out in wages for the time employed.

SUMMARY OF AVERAGE ANNUAL EARNINGS OF OPERATIVES IN THE PRINCIPAL MANUFACTURING STATES.

(NOT INCLUDING OFFICERS, FIRM MEMBERS, CLERKS, OR PIECEWORKERS.)

STATES.	Average number of employés.	Total wages.	Average annual earnings per employé.
Maine:			
Males	3,024	$1,232,171	$407.46
Females	1,661	458,070	275.78
Children	150	22,659	151.06
New Hampshire:			
Males	3,836	1,609,269	419.52
Females	3,303	984,847	298.17
Children	225	39,424	175.22
Connecticut:			
Males	6,330	2,734,741	432.03
Females	3,676	1,141,179	310.44
Children	526	92,053	175.01
Massachusetts:			
Males	20,479	8,738,479	426.70
Females	14,186	4,176,465	294.41
Children	1,080	294,799	174.54
Rhode Island:			
Males	8,702	3,804,364	437.18
Females	6,630	2,034,310	306.83
Children	1,742	285,185	163.71
Vermont:			
Males	1,146	492,698	429.93
Females	867	274,021	316.06
Children	41	6,132	149.56
New York:			
Males	12,235	5,182,350	423.57
Females	11,512	3,230,564	280.63
Children	1,952	316,910	162.35
New Jersey:			
Males	3,098	1,282,634	414.02
Females	2,781	684,605	246.17
Children	290	49,433	170.46
Pennsylvania:			
Males	17,832	$8,130,939	$455.97
Females	16,843	4,850,354	287.97
Children	4,597	724,774	157.66
Delaware:			
Males	87	34,778	399.75
Females	37	7,365	199.05
Children	39	4,426	113.49
Ohio:			
Males	656	248,966	379.52
Females	1,113	228,582	205.37
Children	196	27,987	142.79
Illinois:			
Males	697	284,908	408.76
Females	1,299	334,710	257.67
Children	69	9,811	142.19
Indiana:			
Males	903	319,357	353.66
Females	907	181,835	200.48
Children	132	12,889	97.64
Georgia:			
Males	97	25,590	263.81
Females	166	34,734	209.24
Children	71	6,835	96.27
Kentucky:			
Males	821	271,544	330.75
Females	728	167,034	229.44
Children	178	25,105	141.04

A somewhat similar differentiation of the actual earnings of males, females, and children may be made for each branch of the industry, as appears on the following page.

AVERAGE ANNUAL EARNINGS, ALL CLASSES OF EMPLOYÉS.

(NOT INCLUDING OFFICERS, FIRM MEMBERS, AND CLERKS.)

WOOLEN MILLS.			
EMPLOYÉS.	Average number of employés.	Total wages.	Average annual earnings per employé.
Total	79,351	$28,478,931	$358.90
Males	44,485	19,369,646	435.42
Females	30,240	8,400,688	277.80
Children	4,626	708,597	153.18

WORSTED MILLS.			
Total	43,593	15,889,183	364.28
Males	19,658	9,354,463	475.86
Females	20,110	5,889,096	292.84
Children	3,825	636,624	166.44

CARPET MILLS.			
Total	29,121	11,633,116	399.48
Males	14,034	7,018,483	500.11
Females	13,082	4,251,080	324.96
Children	2,005	363,553	181.32

FELT MILLS.			
EMPLOYÉS.	Average number of employés.	Total wages.	Average annual earnings per employé.
Total	2,266	$1,041,296	$459.53
Males	1,594	878,282	550.99
Females	510	135,703	266.08
Children	162	27,311	168.59

WOOL HAT MILLS.			
Total	3,592	1,363,944	379.72
Males	2,309	1,092,694	473.23
Females	1,124	252,965	225.06
Children	159	18,285	115.00

HOSIERY AND KNITTING MILLS.			
Total	61,209	18,263,272	298.38
Males	16,366	7,682,430	469.41
Females	9,027	10,049,993	245.56
Children	3,916	530,849	135.56

Rates of wages as here reported are subject in many cases to qualifications that can not be statistically shown. It is still the rule with many establishments, particularly when located in villages and smaller towns, to own tenements and houses, which are occupied by operatives at lower rents than those prevailing in the neighborhood. The boarding house for operatives, conducted by the mill proprietors and affording board at rates somewhat lower than the usual rates, still exists in connection with many mills, although it is much less frequently found than formerly.

Opportunities for overtime work are not frequent, but they sometimes occur, resulting in an increase in the average earnings, which does not appear in the tables showing weekly rates of wages.

The general conditions of labor in the wool manufacture are healthful and will compare favorably with any other industry. As a rule, the atmospheric and sanitary conditions of spinning and weaving rooms are such that the employés are subjected to no hardships from which other industries are exempt. This is particularly true of the mills of more recent construction in the New England and middle states, in which especial care has been taken to properly guard the health and comfort of the operatives. In this respect it is believed that the American woolen and worsted mills are far superior to those of any other country, and the improvement has been especially marked during the last ten years. Neither is the labor especially irksome, in comparison with that of tending machinery in other branches of manufacturing, as is shown by the general good health of the operatives employed in woolen mills. Deaths resulting from diseases in any sense peculiar to the industry, or incident to the occupation, are unknown. Accidents are not of frequent occurrence, and they are more rigidly guarded against than formerly, in consequence of the establishment of factory inspection in most of the manufacturing states and of the passage of employers' liability laws. In other respects, the lot of the operative in woolen mills has steadily improved. Until about 1870 payments were made at irregular intervals, according to the convenience of employers, sometimes monthly, sometimes quarterly; now, as a rule, they are made weekly in the eastern and middle states. All payments are now made in cash, except in a few western mills, the use of store orders having been generally abandoned since the war.

Prior to 1850 it was customary to begin work in all woolen mills as soon as it was light and to work as late as the light would allow, with no fixed regular hours. In the short days, for about six months in the year, it was customary to work until 9 in the evening, taking half an hour each for breakfast, dinner, and supper, 12 hours of work being the rule, summer and winter. For many years later the breakfast was a meal taken after an hour or more of work. About 1855, 11 hours began to be the general day's work, and this continued in most states until about 1875, when the 10-hour system came into use.

All the great manufacturing states now have ten-hour laws, differing in details in some instances, but virtually the same in their effect, with reference to the employment of women and children, which control the hours in which the machinery can be kept in operation to advantage. Since this census was taken Massachusetts has reduced the working hours of women and children by statute from 60 to 58 hours per week.

PERCENTAGE OF LABOR COST TO TOTAL COST OF MANUFACTURE.

The relation of labor cost to the total cost of manufacture can not be determined from these tables. Such a percentage is apparently secured by the simple process of adding all the items of cost and ascertaining the percentage of the total which was paid out for labor. The percentage thus obtained for this industry is 25.64; but it is not a true percentage as appears from the fact that the sum paid out for partly manufactured products, such as yarns, is a sum increased by the amount of the labor cost of manufacturing those yarns; and this labor cost has been counted but once, in the labor column, while the value of the materials has been counted twice, once as wool or cotton in the raw state and once as yarns. In other words, the methods of census compilations are such as to render it impossible to obtain from the figures a true percentage of labor cost as compared with the whole cost of manufacture. Such a percentage of labor cost, if ascertainable, would have little significance, for the reason that it is an exceedingly variable element and fluctuates in every variety of goods manufactured according to the value of the stock employed or the fineness and finish of the goods manufactured. A cheap satinet, made of low-priced stock, will for that reason show a comparatively high percentage of labor cost, while a fine worsted cloth, manufactured from costly wool, may show a percentage of labor cost no greater than that of the satinet, although the actual labor cost to manufacture a yard of the latter is double or treble the labor cost in a yard of satinet.

THE PRODUCTS OF WOOL MANUFACTURE.

The wool manufacture differs from every other textile industry in the almost endless variety of its specific products and their ever changing characteristics. It is broadly divided into six grand groups or classes, some of which have little in common with others beyond the fact that they utilize the same raw material. These six grand groups or classes are: (1) the woolen manufacture proper, (2) the worsted manufacture proper, (3) carpets, (4) felt manufactures, (5) wool hats, and (6) hosiery and knit goods. A seventh class might be added to include the shoddy manufacture, the statistics of which are here given. Each of these grand divisions is subdivided into a great variety of products, which again have little kinship with each other.

Still again, there is another class of products manufactured from wool, commonly called "small wares" in the trade, and for which there is no equivalent term in any language, the French word "passementerie" being much too limited in its significance to cover the case. The felting property of wool renders it useful in a thousand different forms which have no relationship whatever to clothing, such as materials for sheathing roofs and vessels, nonconducting envelopes for steam boilers and pipes, gun wads, polishing wheels, hammers for piano keys, and the like. Wool is manufactured in combination with all other fibers, with asbestos and India rubber, and is also utilized in the manufacture of an endless variety of braids, gimps, gorings, and similar appurtenances, which it is impossible to separately classify.

These characteristics of the industry render the grouping of its products extremely difficult for purposes of census classification. The trade names by which certain fabrics are known at one census period may stand for goods essentially different at another. For this reason these trade classifications or designations have been dropped, except as to the well-defined groups of staple goods, and a new one has been adopted, based primarily upon the composition of fabrics. This new classification furnishes a clearer conception of the nature of the industry and its products. It also supplies a more accurate basis of comparison for future census inquiries.

Only a general comparison of the products of the wool manufacture in 1880 and 1890 can be made. This was inevitable, even had the classification of 1880 been adhered to, so great have been the changes in the nature of fabrics in the interval.

Direct comparison is impossible for another reason. The products of the mills were reported at the census of 1880 in running yards; they varied in width from one-half to one and one-half yards and over, according to the nature and use of the fabric. An aggregate based upon such a variable unit of width would have been meaningless, and hence none was attempted at the census of 1880. The returns of piece goods for the present census were all reduced to square yards, and are so reported in the tables. Thus a definite knowledge of the quantity of product is secured, and an accurate basis for comparisons at future censuses obtained.

Each of the six classes of manufacture was separately reported in 1880, and is now again separately reported; so that the relative growth of each, as measured by value of products, is indicated by the tables.

CLASSIFICATION OF PRODUCTS.

In each class the use of other raw materials than wool is common to the manufacture in all countries. This is particularly true of woolen and worsted goods, the two groups in which are included nearly all the fabrics which enter into the clothing of the people. In these two groups the basis of primary classification adopted was as follows:

(1) All wool fabrics.

(2) Fabrics of cotton warp with wool filling.

(3) Fabrics composed either in warp or filling, or both, of wool, cotton, or shoddy combined, commonly known as union or merino goods.

This classification of products is as essential to a full understanding of the industry in these branches as the division into woolen goods made of carded materials, and worsted goods made of materials that have passed through the combing machine. The subdivision of the product into the different varieties of fabrics for men's and women's wear is further indicated in the tables with as close a classification as possible.

Analysis of the tables now submitted shows a total of 381,004,461 square yards of goods turned out by the woolen and worsted mills whose operations are covered by this report, subdivided as follows:

PRODUCTS.	Square yards.	Value.
Total	381,004,461	$169,409,239
All-wool goods	130,115,152	81,742,586
Cotton-warp goods	194,566,427	63,361,087
Union goods	56,322,882	24,304,966

A complete summary of all products, according to a classification contained in the schedule of inquiry and based on commercial use, is presented in the following table:

PRODUCTS.	Quantities.	Value.
Woolen, worsted, union, and cotton warp cloths, coatings, cassimeres, etc., for men's wear ..... square yards..	104, 938, 311	$83, 523, 714
Woolen, worsted, union, and cotton warp overcoatings, cloakings, etc., for men's and women's wear. square yards	14, 883, 893	13, 082, 801
Woolen, worsted, union, and cotton warp dress goods, suckings, tricots, ladies' cloth and broadcloth, alpacas, mohairs, etc., for women's wear ..... square yards..	126, 692, 829	32, 149, 923
All-wool, union, and cotton warp flannels ..... do....	61, 195, 501	18, 582. 549
Satinets ..... do....	18, 630, 656	4, 296, 082
Linings, Italian cloths, and lastings ..... do....	4, 585, 080	1, 255, 520
Jeans, kerseys, and linseys ..... do....	17, 126, 217	4, 738, 034
Jersey cloth ..... do....	3, 072, 533	2, 171, 328
Buntings ..... do....	566, 880	135, 983
Carriage cloths ..... do....	1, 282, 921	626, 791
Total piece goods ..... do....	352, 974, 821	160, 562, 725
Woven shawls of wool or worsted ..... do....	4, 758, 652	2, 098, 523
All-wool, union, and cotton warp blankets ..... do....	20, 793, 644	7, 153, 900
All-wool, union, and cotton warp horse blankets.... do....	5, 507, 074	1, 721, 516
Carriage robes ..... do....	775. 963	646, 904
Total ..... do....	31, 835, 333	11, 620, 843
Woolen, worsted, and union upholstery goods. square yards.	4, 131, 288	3, 634, 133
Braids and picture cords ..... running yards..	133, 859, 751	
Ingrain carpets, 2 and 3 ply, and ingrain art carpets ..... square yards..	36, 726, 370	15, 924, 452
Tapestry and body brussels, tapestry velvet, Wilton, Axminster, and Moquette carpets ..... running yards..	36, 536, 565	27, 125, 980
All other carpets ..... square yards....	1, 521, 330	784, 204
Rugs of all kinds ..... number..	1, 563, 803	2, 629, 781
Total value of carpets and rugs	.....	46, 464, 417
Felts ..... square yards..	6, 950, 001	3, 120, 293
Wool hats ..... dozens..	1, 046, 481	5, 229. 176
All wool and union or merino yarns ..... pounds..	42, 215, 173	13, 062, 970
Worsted yarns ..... do....	29, 376, 182	22, 411, 363
Cotton yarn ..... do....	3, 692, 936	782, 849
Wool rolls, noils, waste, and all other partly manufactured products ..... do....	12, 850, 039	3, 176, 653
Total yarns and partly manufactured products	88, 134, 330	39, 433, 835
Woolen, merino, and cotton half hose ..... dozens..	7, 080, 943	7, 441, 852
Woolen, merino, and cotton hose ..... do....	10, 072, 033	11, 749, 438
Merino, all-wool, and cotton shirts and drawers .... do....	6, 866, 157	33, 009, 997
Leggings and gaiters ..... do....	25, 072	85, 401
Gloves and mittens ..... do....	898, 081	1, 942, 030
Hoods, scarfs, nubias, etc ..... do....	342, 497	1, 476, 430
Cardigan jackets, etc ..... do....	361, 478	3, 576, 248
Knit shawls ..... do....	22, 090	115, 467
Fancy knit goods, wristers, etc ..... do....	270, 033	759, 748
Boot and shoe linings ..... yards..	7, 596, 711	1, 088, 558
Total	.....	61, 245, 169
All other products	.....	6, 457, 933
Total value of products	.....	337, 768, 524

The total value of all the products of the wool industry in 1890 is shown by these tables to be $337,768,524, exclusive of the products of shoddy mills and plants operated in penal, reformatory, and eleemosynary institutions.

GROSS AND NET VALUES.

The above value of products is accurately compiled as it appears upon the schedules returned by the manufacturers; but it is a gross value, i. e., the value at the mills of all the marketable products of those mills, whether wholly or partially manufactured, as previously explained in this report, page 21.

In the wool manufacture the chief item of duplication is the purchased yarns, and care has been taken to keep this item so separated from others that the net value of the wool manufactures of the country can be readily ascertained. Thus the value of woolen and worsted yarns purchased in 1890 was $34,631,025, and of this sum (after subtracting the duty paid value of foreign yarns imported, $3,114,930), $31,516,095, is duplicated in the column of gross value of product, and must be deducted from that total value, leaving the net value at $306,252,429. The increase in the net value of products is 21.17 per cent as compared with an increase of 26.39 per cent in gross value.

Inasmuch as the statistics of the shoddy manufacture are not included in the gross value of the products of wool mills, the total gross products of the wool manufacture should be increased by the sum of $1,975,781 (from which is to be deducted the value of woolen yarn purchased, $4,000), the value of the completed fabrics manufactured in the shoddy mills, making the total gross value of woolen products $339,740,305, and the total net value $308,224,210.

Previous censuses of the wool manufacture have failed to call attention to this duplication of products and the distinction between gross and net value of products. The same duplication occurred in all of them, and the necessity thus exists for making all the comparisons of this report on the basis of the gross value.

Prior to the census of 1870 no account was taken of yarns purchased. In the census of that year purchased yarns were reported by quantities only, values being omitted. Net values are thus only obtainable for the censuses of 1880 and 1890. In the former year 24,078,253 pounds of woolen and worsted yarns were purchased, having a value of $15,769,016, which amount, less the value of yarns imported in 1880 (635,755 pounds, valued at $1,262,489), subtracted from the gross value of products reported, $267,252,913, leaves a net value of $252,746,386 for the products of the manufacture in 1880.

The total quantities of yarns purchased in 1890, 1880, and 1870, including yarns made in other textile mills, and therefore not duplicated in the gross values of this report, are shown in the following tables, the second of which gives the comparative amount of these purchased yarns used in each branch of the industry at each period:

YARNS PURCHASED—COMPARATIVE SUMMARY.

Years.	Total pounds of yarn.	Value.
1890	a178,858,121	$58,467,726
1880	68,393,298	26,484,683
1870	23,524,911	Not given.

a This includes mohair, silk, jute, and linen. Without these the amount would be 143,824,249 pounds, valued at $52,616,401.

YARNS PURCHASED IN 1890.

YARNS.	TOTAL.		WOOLEN MILLS.		WORSTED MILLS.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Total	178,858,121	$58,467,726	32,175,910	$12,007,406	22,307,298	$15,347,357
Woolen	31,385,604	11,285,379	4,982,919	3,000,984	903,174	355,592
Worsted	28,813,717	23,345,046	2,560,619	2,540,667	11,551,264	11,814,625
Cotton	83,624,868	17,985,376	23,990,406	5,239,928	9,454,874	2,441,972
Mohair	738,777	534,169	324,181	297,995	232,071	212,864
Silk	244,306	1,395,170	120,571	632,545	46,138	344,556
Spun silk	131,520	591,226	60,358	281,211	19,427	127,775
Jute	23,795,444	1,709,461	125,527	13,181	.....	.....
Linen	10,123,816	1,621,293	2,529	895	100,350	50,473

YARNS.	CARPET MILLS.		FELT MILLS.		WOOL HAT MILLS.		HOSIERY AND KNITTING MILLS.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Total	80,811,257	$14,760,639	10,241	$2,019	350,000	$24,982	43,203,415	$16,325,323
Woolen	18,763,201	4,112,324	.....	.....	350,000	24,982	6,386,370	3,791,497
Worsted	10,555,799	4,711,249	.....	.....	.....	.....	4,146,035	4,279,105
Cotton	17,920,498	2,712,484	10,241	2,019	.....	.....	32,248,849	7,588,973
Mohair	182,400	23,712	.....	.....	.....	.....	125	98
Silk	.....	.....	.....	.....	.....	.....	77,597	418,075
Spun silk	.....	.....	.....	.....	.....	.....	42,744	182,240
Jute	23,670,117	1,696,280	.....	.....	.....	.....	.....	.....
Linen	9,719,242	1,504,590	.....	.....	.....	.....	301,695	65,335

Another differentiation in the industry is in the separate establishments for dyeing and finishing woolen goods. The added value imparted to product by the finishing processes of these separate establishments must be added to the figures above given to obtain a true net value. From the report on Dyeing and Finishing Textiles is obtained the following summary of these added values in wool, yarns, woolen and worsted goods, and mixed textiles:

DYEING AND FINISHING.

MATERIALS.	Quantity.	Added value.
Total		$4,017,366
Woolen yarns, dyed (pounds)	17,999,651	751,801
Worsted yarns, dyed (pounds)	9,342,157	493,974
Wool stock dyed (pounds)	1,160,666	48,828
Wool and worsted piece goods dyed (square yards)	20,770,034	652,998
Mixed textile piece goods dyed (square yards)	60,716,250	2,069,765

THE REDUCTION IN MARKET VALUES.

No exact method exists whereby the relative quantities of goods represented by the total values of products reported in 1880 and 1890 can be ascertained. The constant variations which occur in the characteristics of fabrics, and the corresponding variations in the quality and value of the raw materials utilized for their manufacture, destroy any general standards of comparison. Careful investigation of price lists covering the whole period between 1880 and 1890 determines that the fall in the value of manufactured products during that period has borne the natural relation to the fall in the value of the raw materials of which they are composed. The following table gives the average cost per scoured pound of foreign and domestic wool utilized in the wool manufacture and in each of its branches, as shown in the censuses of 1890 and 1880, and also the percentage of decrease:

AVERAGE COST OF SCOURED WOOL CONSUMED IN THE WOOL MANUFACTURE, AND IN EACH CLASS, 1890 AND 1880.

MILLS.	Quantity. (Pounds scoured.)	Cost.	Average cost per pound. (Cents.)	Per cent of decrease.
Total:				
1890	214,945,513	$98,540,484	45.84	19.34
1880	171,880,831	97,681,604	56.83	.....
Woolen mills:				
1890	100,226,094	48,859,811	48.75	20.60
1880	109,724,213	67,380,250	61.40	.....
Worsted mills:				
1890	54,980,746	28,280,287	51.43	11.10
1880	26,334,635	15,235,878	57.85	.....
Felt mills:				
1890	4,213,230	1,841,382	43.70	26.48
1880	2,733,796	1,624,871	59.44	.....
Wool hat mills:				
1890	3,018,114	1,448,709	48.00	34.69
1880	3,597,279	2,644,293	73.50	.....
Carpet mills:				
1890	35,726,837	9,855,787	27.59	6.79
1880	23,563,216	6,975,120	29.60	.....
Hosiery and knitting mills:				
1890	16,771,492	8,254,418	49.22	23.64
1880	5,927,692	3,821,183	64.46	.....
Quantity of wool "in condition purchased":				
1890	372,797,413	98,540,484	0.26	21.21
1880	296,192,229	97,681,604	0.33	.....

These average values appear abnormally low when compared with the prices of scoured wools given in current market quotations. But it is to be borne in mind that the latter quotations relate to the standard grades of wools. The enormous quantities of inferior and "unmerchantable" wools in every year's clip possess a scoured value much less than the average above indicated. The average value of the total clip of the United States in 1890, in the condition marketed, is estimated at about 26 cents in commercial quarters, and this estimate permits a shrinkage of 49 per cent to reach the average value of scoured domestic and foreign wools shown at this census. The relative

average prices as between 1880 and 1890 correspond closely with the general decline in the value of wool in the ten years, as indicated in current market quotations.

An average decline in the cost of scoured wool of 19 per cent may be assumed to mean a somewhat smaller decline in the cost of the manufactured goods. The materials constitute about one-half the cost of the manufactured goods on the average. There has been an increase in the rates of wages in this industry during the decade, but not corresponding with the fall in the cost of raw materials. On the other hand, there has been a cheapening of the cost of manufacturing through the greater efficiency of improved machinery, but not sufficient to offset these increased wages. The balancing of these shifting elements in cost results in the conclusion that the reduced cost of production in the decade is from 8 to 10 per cent, which reduced cost represents the reduction in values. Any temporary advantage which comes to manufacturers from a fall in the cost of raw materials must almost immediately be yielded in their own prices, so close has become competition in all lines of standard goods. Reckoning the fall in the value of goods as 8 per cent in the decade, the value of the products of 1890 would have been $367,139,700, on the basis of values which obtained in 1880.

NOMENCLATURE.

The fundamental terms by which the distinct fabrics of the wool manufacture are designated are simple and well defined as to their meaning, are of universal application, and are used throughout this report in their commonly accepted significance.

Other forms of nomenclature have been for the most part discarded, as tending to confuse. They are innumerable in number, and are the result of the ingenuity of manufacturers who, having devised some new style or design of fabric, seek to distinguish it in the market by affixing a novel and distinguishing name. Hundreds of such names have thus been introduced into the speech of the manufacturer, most of which disappear with the fabric to which they are applied. Other names, used to describe some radical departure from ordinary fabrics, remain and become fixtures in the nomenclature of the trade, but often with an ultimate significance different from that originally attaching to them. These names rarely have any etymological signification and are constantly reappearing in different connections.

The fundamental distinctions between different fabrics are due primarily to the method of spinning the yarns, whether woolen or worsted, and secondarily, to the weaves employed in fabrication. The primary difference in classification is subsequently explained. The classification by weave applies to the system of harnesses by which the loom is equipped for different tissues. There are four fundamental weaves, from which all other simple fabric are variations:

(1) The plain weave, which is the simplest fabric, in which but two harnesses are employed, forming a simple interlacement of the threads of the warp and weft. This is the weave of broadcloth, cotton shirtings and sheetings, and mousselines de laine. (2) The twilled weave, produced by three or more harnesses. (3) The satin weave, produced by five or more harnesses, the effect of which is to bring the threads of either the warp or the weft prominently to the face. (4) The gauze or leno weave. Different effects are produced from derivatives and combinations of these fundamental tissues. Thus, in the most simple, that of cloth or plain weave, varied effects are produced by the greater or less torsion of the threads, and the direction in which they are twisted; by variations in the size of the warp or weft compared with each other; by making the weft pass alternately over two threads and one thread of the warp, making a "rep" or corded tissue, etc. Still other variations are made by the use of different materials in the warp or weft by making them of pure wool and of a single color, or mixed with silk, mohair, etc. The four fundamental interlacements, which form the base of the most complicated tissues, are further varied by combinations of crossings of the threads which occur at variable places at each course of the thread across the web, forming figured, brocade, or damasked effects, which are produced by the jacquard loom. Another variation is made by having two warps, one to form the ground of the tissue and the other made to pass over wires to form a loop, making velvet or pile fabrics.

CLASS I—WOOLEN GOODS.

The primary group of wool manufactures, that which was first to take root in the United States, and is most intimately associated with the domestic economy of the people, is that which is called woolen goods proper, and which includes all carded wool woven fabrics, from the homespun cloth to the broadcloth, the fancy cassimere, the flannel, the blanket, etc.

The status of this branch of the manufacture at each census period since 1840 is shown in the following table:

STATISTICS OF WOOLEN MILLS: 1840–1890.

YEARS.	Number of establishments.	Capital.	Miscellaneous expenses.	Average number of employés.	Total wages.	Cost of materials used.	Value of products.
1840	1,420	$15,765,124	.....	21,342	.....	.....	$20,696,999
1850	1,559	28,118,650	.....	39,252	.....	$25,755,991	43,207,545
1860	1,260	30,802,654	.....	41,360	$9,610,254	36,586,287	61,894,986
1870	2,891	98,824,531	.....	80,053	26,877,575	96,432,601	155,405,358
1880	1,990	96,095,564	.....	86,504	25,836,392	100,845,611	160,606,721
1890	1,311	a130,980,040	$8,402,623	79,351	28,478,931	82,270,335	133,577,977

a This amount does not include the value of "Hired property".

The most striking fact brought out by the returns for 1890 is the decline in the market value of the products of woolen mills as compared with 1880. These products are now returned at a value of $133,577,977, and in 1880 they reached $160,606,721, a decrease of 16.83 per cent.

This decline is the result of the change from the woolen to the worsted fabric, a change forced upon the industry by the requirements of popular taste. The production of worsted mills has enormously increased, the growth being equal to 136.05 per cent. These goods have taken the place of the carded wool fabrics, which up to thirty years ago constituted the entire production of men's-wear goods in the United States.

The quantity of raw materials consumed in woolen mills was greater in 1890 than in 1880, being 200,543,253 pounds in the former year, as against 186,868,828 pounds in 1880, an increase of 13,674,425 pounds, or 7.32 per cent, as shown by the following table:

MATERIALS USED.	1890 (Pounds.)	1880 (Pounds.)
Total	200,543,253	186,868,828
Scoured wool (domestic and foreign)	100,226,094	109,724,213
Camel's hair and noils	1,781,240	1,234,064
Mohair and noils	60,533	84,080
All other animal hair	9,619,277	4,497,524
Cotton purchased	36,993,712	24,744,964
Shoddy	51,862,397	46,583,983

It follows that the quantity of products in this branch of industry was greater than in 1880, notwithstanding the decrease in value.

This analysis of the raw materials consumed in this branch of the industry demonstrates a slight deterioration in the average quality of products. While the quantity of scoured wool consumed decreased by over 9,000,000 pounds, the consumption of shoddy, cotton, and miscellaneous animal hair increased 22,648,915 pounds.

A large part of these substitutes or adulterants were consumed, not in the manufacture of cloths, but in low grade yarns for cheap carpets, in cotton products, and in horse blankets, in all of which there was a great increase of product in woolen mills.

Nevertheless it is true that the competition with worsted goods has compelled the woolen manufacture proper to cater more directly to the demand for cheaper grades of clothing material, so that the change in the character of materials used, shown above, is natural and explained by the peculiar conditions surrounding this industry. The demand for a cheap fabric exists and steadily increases, and it can only be met by the partial use of materials cheaper than wool.

WOOLEN CLOTHS.

The great branch of the woolen manufacture proper is the production of cloths for men's wear. The production of cloths of this description aggregated 112,225,297 square yards, valued at $60,258,252. In their general characteristics these cloths have changed very slightly since the beginning of the industry in the United States. There are some exceptions to this rule which are worthy of note. At the beginning of factory manufacture the woolen cloths consisted almost wholly of plain cloths, known as broadcloths; plain twilled fabrics similar in face to broadcloths, known as cassimeres and kerseymeres, and satinets. Several of the earlier mills brought the manufacture of broadcloths to a high degree of perfection. Samples are still in existence of blue and black broadcloths made at the Vassalboro mill in Maine, in 1853, from selected Silesian wool, costing, with duties and charges, about $3 a pound, and woven with 120 picks to the inch, which were conceded by experts from various countries to equal in fineness and finish the best products of the West of England mills, which had occupied in all international expositions the position of pre-eminence. It was thus made evident that in this particular fabric,

which is substantially the same to-day as when first made in the French convents four centuries ago, and which for that reason is regarded as the typical product of the industry, can be manufactured in the United States with as high degree of perfection as anywhere else, the economic conditions being equal. (*a*)

The diminution of the American broadcloth manufacture has been commonly traced to the tariff of 1846, which imposed a duty upon the fine imported Saxony wools out of which the fine grades were made, equal to the duty on the goods themselves. The decline dates from that period; but it has been greatly influenced or accelerated by other causes; the constantly diminishing domestic supply of superfine wools, the Saxon wool culture, for which there was such a craze for the fifteen years following the tariff of 1824, having long since disappeared; and the change in the popular taste, which has practically destroyed the market for broadcloths. With the introduction of fancy goods the demand for broadcloths ceased, except for special purposes. A similar although not equal diminution has occurred in the fine cloth manufacture of other countries.

SATINETS.

From the broadcloth, which represents one extreme of wool manufacture, we turn to the satinet, which is typical of the other extreme, and equally a product of the earliest American woolen mills. The total quantity of satinets produced in 1890 was 18,630,656 square yards (usually three-fourths of a yard in width), valued at $4,296,082, or an average value per square yard of 23.06 cents, or 17.29 cents per running yard. This was an increase from 16,629,116 running yards in 1880 (value not then given) to 24,840,875 running yards in 1890. The values here indicated are evidence enough that there is an abundance of cheap clothing in the United States. In the earlier part of the century the cheapest cloths having any claim to be called woolen cloths could not be made in factories for three times this cost. As a consequence the people were at that time more largely clothed in all-cotton garments than is the case to-day. But the satinet of those early days was an entirely different fabric from the present satinet, the relative cheapness having been brought about by changes in processes, and by the knowledge of how to use cheaper materials to advantage. The early satinet was a cloth made on a cotton warp with a filling spun from the ordinary grades of domestic fleeces, the waste of which was practically lost. It is that waste, combined with other renovated wastes, cotton, etc., which now constitutes the filling of the satinet. The original satinet was a plain cloth, made of dyed yarns. The present satinet is a printed fabric, in which, by the use of fast colors, an effect is obtained similar to that of the fancy cassimere. These goods will not retain the appearance nor endure the wear of all-wool goods. But in proportion to their cost they answer their purpose quite as well. Although the figures given indicate a marked increase in production, this class of goods has suffered severely of late from the competition of the cheaper grades of fancy cassimeres, and more particularly from the transient popularity of cheviot goods, so called, which are rough, openly woven woolen goods, made in black or mixed colors from coarse wool. The relative quantity of satinets manufactured is to-day much smaller than before the war.

JEANS.

Another group of goods belonging to this category is jeans, which differs from the satinet chiefly in that it is a plain fabric with a twilled weave. The quantity produced was 17,126,217 square yards, having a value of $4,738,034, which shows a somewhat higher average of value than the satinets. These goods are largely made in the west, where there are a number of mills which devote their entire machinery to turning out supplies of these goods to meet the western and southern demand for a cheap, substantial, every-day fabric.

FANCY CASSIMERES.

The predominating group of the woolen manufacture is next in order of consideration, and is the largest in the quantity and value of its products, although one of recent development. These cloths in all their varieties are commonly grouped under the name of fancy cassimeres. Their manufacture dates from the year 1836, and they have worked a practical revolution in the industry as previously conducted. In 1834, a certain M. Bonjèan, a wool manufacturer of Sedan, France, devised a modification of the plain cloths hitherto universally made, by uniting upon the same stuff different tints or patterns of tissue, by the use of the jacquard loom. The goods were susceptible of as many varieties of pattern or style as the fancy might dictate, and at once became immensely popular, not only in France, but in all manufacturing nations. The beginning of their manufacture in this country is traced to Mr. Samuel Lawrence, then the agent of the Middlesex mills, at Lowell, Massachusetts, and Mr. George Crompton, the inventor of the Crompton loom. Mr. Lawrence had seen specimens of the goods, and he applied to

a Thaddeus Clapp, of Pittsfield, Massachusetts, wrote in 1877 as follows: "The first broadcloth made in this country was by Scholfield in 1804. The cloth was a gray mixed, and when finished was shown to the different merchants and offered for sale, but could find no purchasers in the village. A few weeks subsequently Josiah Bissell, a leading merchant in town, made a voyage to New York for the purpose of buying goods, and brought home two pieces of Scholfield's cloths, which were purchased for the foreign article. Scholfield was sent for to test the quality, and soon exhibited to the merchant his private marks on the same cloth which he had before rejected. In 1808 Scholfield manufactured thirteen yards of black broadcloth, which were presented to James Madison, from which his inaugural suit was made. Five merino sheep were introduced about this time in this town, and Scholfield was able to select enough to make this single piece, and President Madison was the first President who was inaugurated in American broadcloth."

Mr. Crompton to test the feasibility of constructing a loom for their manufacture, on a pattern already successfully applied in cotton fabrics. In 1840 Mr. Crompton succeeded in adapting his cotton loom to the manufacture of fancy woolens, and it was put in operation in the Middlesex mills. Up to this time no fancy woolens of any description had been woven in the United States, and here were made the first fancy cassimeres woven by power anywhere in the world. For many years afterward the hand loom continued to be solely employed for these goods in France and all foreign countries; and their manufacture, by power, progressed more rapidly here than anywhere else, although the industrial conditions at that time existing made the development exceedingly slow, as is shown by the fact that the whole amount received under the license to manufacture the loom given by Mr. Crompton to Phelps & Bickford, of Worcester, Massachusetts, was only $14,000 during the fourteen year term of the patent on his loom.

The new cloths were adapted to the change which had begun in our domestic wool supply. They required soundness, length, and strength of fiber, rather than the softness and fineness which had been formerly striven for in our fleeces. In the production of this class of goods many American mills gradually secured a degree of excellence which gave them a reputation beyond the limits of our own country, and at the Philadelphia Exposition of 1876 samples of domestic goods were exhibited which were favorably compared with the products of Sedan and Elbeuf in France, which centers have earned the reputation of surpassing the rest of the world in novelty of design and perfection of execution.

FLANNELS.

Important among the products of this branch of the industry, and one of the earliest and most stable, is the flannel of every variety. The flannel manufacture reached considerable dimensions under the household system of industry; and under factory methods no other fabric has been made in such quantities or used for so many purposes. It has attained an enormous development in the United States, not equaled in any other country, and for a period of more than forty years it has been enabled, except in some exceptional fancy varieties, to exclude the foreign article from the home market, an achievement equaled only in the manufacture of blankets and of bunting, and perhaps carpets. The primary cause of the successes of the flannel manufacture in the United States was assigned by John L. Hayes to "the peculiar adaptation of the American wools for this fabric". This adaptation consists in their spinning qualities, their soundness and elasticity, and their medium fineness, producing the requisite softness, without too much felting quality to cause an undue shrinking of the goods.

To this it may be added that flannel being the first stage in the manufacture of plain cloth, and from its simple character requiring a comparatively small labor expenditure, it has naturally received a great degree of attention from American manufacturers on account of the steady domestic demand for the goods. Its uses are multiform and continue to increase. The rigor of our climate created an enormous demand for flannels for underwear, a demand which has of late years been met by knitted underwear goods. As the latter have gradually superseded flannel for undergarments other uses for flannels have increased, and to-day they are in great demand for children's garments, fatigue uniforms for soldiers and policemen, and summer wear of every description.

It is a matter of record that as early as 1821 flannels were made in the state of New York by the predecessor of the present Stott mills that were pronounced equal to the best Welsh flannels. Another record is that the Groveland mill, in Massachusetts, founded in 1804 by Ezekiel Hale, made 30,000 pieces of flannel in 1823; and, in 1827, three mills in the neighborhood of Newburyport, Massachusetts, manufactured goods of this description valued at $700,000.

Of late years the American manufacture of carded wool dress goods, which are simply fancy flannels, has grown to be a distinct and creditable branch of the manufacture, and in beauty, delicacy, variety, and fastness of coloring the industry has attained a degree of perfection nowhere excelled.

The American flannel manufacturers have secured and retained the control of their home market by studying to adapt their products to the peculiar wants of our own people. In this way they have given them certain characteristics which foreign flannels do not possess. In 1835 the "Domett flannel", an original fabric, composed of a cotton warp with a filling of wool, came into use as a substitute for the linsey-woolsey stuffs, originally of household manufacture, and worn by working women for under petticoats. It shrinks but little in washing, and has persistently held its own in the interval as a characteristic domestic product. The red flannels have still a large consumption among working people, especially frontiersmen and lumbermen. About 1859 first appeared the blue flannel coating, wool-dyed, and having a three-leaved twill. This fabric, which is sheared and finished like cloth, but which nevertheless retains the lightness and pliability of the flannel cloth, is also distinctively American in origin and character.

Opera flannels, a name applied abroad to a light flannel more highly gigged and finished than the ordinary flannel, which is piece-dyed uniformly in fancy colors and hot pressed, were first introduced in this country by the Bay State mills, and their manufacture was continued at Ware, Massachusetts, by the late George H. Gilbert, about 1858, in which year he made and sold 4,000 pieces. In 1871 the same establishment made and sold 120,000 pieces of these goods, equivalent to 2,000,000 yards, and the foreign importations had by this time entirely ceased.

Still higher grades of all-wool gauze and silk-warped flannels are successfully made in this country. Flannels were exhibited at the Philadelphia Exposition having 130 picks to the inch, in which the filling yarns were spun to a length of 46,500 yards to the pound and the warps to a length of 34,500 yards.

Another variety of flannel for which the domestic manufacture is distinguished is known as the French plaid, largely used for shirts and children's garments. The present fashion has immensely stimulated the production of these goods, which are made in every variety of pattern and in every form of mixture with cotton and silk.

Of the production of the census year, 61,195,501 square yards, of the value of $18,582,549, are classified as flannels proper, and 52,785,570 square yards, value $15,821,087, as woolen dress goods, which are the fancy flannels above alluded to. We have from the two items combined an aggregate quantity of 113,981,071 square yards, which is almost equal to the quantity of cloths manufactured in woolen mills. The product of woolen dress goods above indicated may be contrasted with the 73,907,259 square yards of worsted dress goods made in the census year to determine the relative popularity of the two varieties of fabrics for women's wear.

BLANKETS.

The next group of woolen fabrics in importance is composed of blankets, which have been classified as house blankets, of which 20,793,644 square yards were manufactured, valued at $7,153,900, and horse blankets, of which 5,507,074 square yards were manufactured, valued at $1,721,516.

By the census of 1880 blankets were reported by pairs to the number of 4,000,000, including horse blankets, of value of $6,840,000, and varying in value from 60 cents to $6 per blanket, the average value per blanket being $1.71. (*a*) The increase in the blanket manufacture is greater than would appear from the difference in the value of the product on account of the excessive fall in values witnessed in this branch of the industry.

The blanket manufacture of the United States will not suffer by comparison with that of any other country, and it has long completely supplied the domestic market. The energies of the manufacturers are largely directed toward the production of the coarse and medium qualities for which there is steady demand. The competition has been so close and the product so even with the demand, if not in excess of it, that there have been many years since the close of the civil war in which the product has found a market without profit to the manufacturer. The stimulation of war prices, the large requirements of the government for the army and navy, and the exclusive possession of the home market had tempted an undue proportion of the smaller mills of the country into the blanket manufacture. They largely continued in it after the war closed, until in 1878 the glut of production became so great that the larger manufacturers found it necessary to relieve the market by an auction sale in New York. At this, the largest sale of woolen fabrics which had occurred in this country, 6,000 cases of blankets, averaging 50 pairs to a case, were sold for $717,940, at an estimated loss of $100,000 on the first cost of the goods. From the first the blanket industry has been subject to vicissitudes. Repeated efforts to establish it successfully in the earlier history of the industry were costly failures. After the tariff of 1842 went into effect the manufacture developed very rapidly until the tariff of 1846, which placed a duty of 30 per cent upon imported wools, while reducing the duty on flannels and blankets to 20 and 25 per cent. After 1857 the blanket manufacture again advanced so rapidly that by 1861 nearly the entire consumption of the country was of domestic production, as it has since continued to be.

Certain high grades of blankets, which originated with the Mission mills of California in 1858, have attained a world wide celebrity for weight, thickness, softness, and perfection of face. Advances have been made in the blanket manufacture in the last ten years in the lighter weights of finer finish. Jacquard borders of two and three colors are now a feature that adds greatly to the appearance of the goods. Many famous mills have been identified with the blanket manufacture of the United States, including older mills which long since disappeared.

SHAWLS.

The manufacture of woolen shawls was at one time an important branch of the industry, but changes in fashion have greatly reduced the output of these goods. There were 4,458,483 square yards of woolen shawls manufactured in 1890, valued at $1,955,214. These shawls were of a great variety of sizes and of qualities, and the statistics indicate nothing as to their average value beyond the fact that the bulk of the product was in cheap grades. Neither is it possible to make any comparison with the shawl production of 1880; for shawls were then returned, not in square yards, but in number, viz, 1,242,979, and no value was given. It is probable that the production did not greatly vary at the two periods.

The manufacture of all-wool plaid shawls, formerly known in this country as the "Bay State shawl", from the mill which introduced it, first assumed importance about the year 1848. Similar shawls had been made many years earlier, notably at the Watervliet mills, West Troy, New York, but upon hand looms, and the product was limited. From 1850 to the close of the civil war a number of larger mills were employed upon these goods, some of them exclusively. Prominent among these mills were the Peacedale, Watervliet, Waterloo, Middlesex, and Washington, formerly the Bay State.

a Bulletin of the National Association of Wool Manufacturers.

The early application of the cassimere twill to this fabric, the facility with which the design is made and varied through the alternate concurrence of the warp and filling, and the ready adaptation of the medium American wools to this product, caused the domestic manufacture of woolen shawls to reach proportions, in the day of its prime, of which no adequate picture is presented by the statistics either of 1880 or 1890. The decline of this branch of the industry was hastened, not only by the popular preference for cloakings as an outside covering, but also by the introduction of the process of dyeing worsted yarns with fast colors, which led to the substitution of worsted shawls, of which there were made 300,169 square yards in 1890.

No serious attempts have been made in this country to produce the highest qualities of shawls. It is not possible, under present conditions, for machine made shawls to compete with the hand productions of the East.

CLASS II—WORSTED GOODS.

A striking feature of these statistics is the development of the worsted manufacture. It may be described in general terms as a treatment of wool after the methods of the cotton manufacture. The worsted manufacture is more complicated and expensive than the woolen manufacture, requiring more machinery of a most costly character and more skill and care in manipulation. The woolen yarn carded and spun on the mule, with few intermediate manipulations, is composed of a loose thread of tangled fibers, interlocking and criss-crossing irregularly, and lacking in tensile strength. The worsted yarn is composed of fibers of wool running parallel with each other, closely twisted into a strand which is smooth, hard, and comparatively strong. This difference between the two yarns is effected by the introduction of the combing machine and gill box, and doubling spindle mechanisms. The function of the combing machine is to lay the fibers of the wool parallel with each other, eliminating the short fibers or noils, all of which are retained in the woolen yarn. The whole process is thus fundamentally different from that of making woolen yarn. Vickerman describes worsted spinning as a series of processes continuously following each other, while woolen spinning is a compound process intermittently carried on. The worsted yarn is perfected by drafting on a series of spindles, and may be spun to a fineness of 33,600 yards, 44,800 yards, and 56,000 yards to the pound, although worsted yarns of such high numbers are rarely made in the United States.

Woven from yarns so fundamentally different, the woolen and worsted fabrics require treatment equally different in the finish, and they are easily distinguished from each other. The one is woven loose and open and is thoroughly fulled. The absence of felting from the worsted constitutes the final difference between a worsted and a woolen cloth. In the former the surface is hard and the characteristics of the weave are distinctly visible.

The worsted manufacture is of very ancient origin in England and France, but it was wholly unknown in the mills of this country until about the middle of the present century. That our wool manufacture should have been so long confined to the woolen form is one of many evidences of the primitive character of the manufacture here as compared with Europe. Very early in the century worsteds had become popular in Europe, and before our first worsted mill was constructed the manufacture nearly equaled that of woolens both in England and France.

The first attempt at the manufacture of worsted in the United States was at a mill in Ballardvale, Massachusetts, in 1843. The manufacture of delaines was here undertaken by John Marland, employing about thirty looms. The experiment extended to delaines for printing, in which the block process was used, and also to goods dyed in the piece. All the wool was combed by hand. The enterprise was not regarded as successful, largely, perhaps, because of the limited means of its projectors.

The Amoskeag mills, at Manchester, New Hampshire, was the second establishment to attempt this manufacture, and it persevered for about seven years. In 1845 the Manchester mills, in New Hampshire, built a large mill for the manufacture of delaines. At first this company used carded wool only. Their first combing machines were introduced about 1855, very shortly after they had superseded the hand comber in England. The wools used were a high grade of Ohio and Pennsylvania merino. The Manchester mills printed their own delaines from the start. All delaines had previously been printed by hand by what was known as the block machine, a slow and expensive process. At Manchester the so called Birch machine was used for a time, but the use of the cylinder for printing calicoes almost immediately suggested the similar method of printing delaines now universally in use. The original delaines made by this company were goods averaging about seven yards to the pound, and the popularity of the fabric may be inferred from the fact that the Manchester mills for years made delaines of the value of $1,000,000 per annum. The fashions changed about 1868, but printed worsteds of a somewhat lighter weight are still made at these and other mills.

The success of these pioneers brought other mills into the field. The Hamilton Woolen Company, at Southbridge, Massachusetts, soon afterward converted their mill from a woolen cloth factory into a dress goods mill, and in 1853 the Pacific mill, at Lawrence, was organized for the manufacture of the same class of fabrics. This mill also began by using carded yarn, but in 1854 it imported six combing machines of the Lister pattern, which are believed to be the first set up in this country. The Washington mills afterward followed, and made the first all-wool worsted dress goods manufactured in America.

The census of 1860 took cognizance of but three worsted mills as then in existence in the United States, the Manchester, Pacific, and Hamilton. The development of the industry from that date until the present time is shown in the following table:

STATISTICS OF WORSTED MILLS: 1860–1890.

YEARS.	Number of establishments.	Capital.	Miscellaneous expenses.	Average number of employés.	Total wages.	Cost of materials used.	Value of products.
1860	3	$3,230,000	.....	2,378	$543,684	$2,442,775	$3,701,378
1870	102	10,085,778	.....	12,920	4,368,857	14,308,198	22,090,331
1880	76	20,374.043	.....	18,803	5,683,027	22,013,628	33,549,942
1890	143	a68,085,116	$4,917,760	43,593	15,880,183	50,706 769	79,194,652

a This amount does not include value of "Hired property".

The American manufacture of worsteds received its great impetus under the operation of the reciprocity treaty with Canada, whose sheep were wholly of English blood, producing the long combing wools peculiar to those breeds, of which there were in 1860 but few grown in the United States. Of the 6,000,000 pounds of this long wool grown in Canada at that period about 4,000,000 pounds were exported to the United States, where they were converted into a great variety of fabrics then extremely popular for female wear, and just beginning to be manufactured in quantities: alpacas, brilliantines, poplins, grenadines, and similar goods to which fancy names were attached with almost every change in contexture and pattern. The same period witnessed the successful beginnings of American efforts in the manufacture of furniture goods, moreens, damasks, reps, mohairs, braids, and other goods of this class. Great improvements in combing machinery during this period stimulated these industries. The transient popularity of fabrics of alpaca, hard and lustrous, was met by the American discovery that by the use of cotton warps with a filling of combing wool an excellent substitute for alpaca could be had.

Even at this time, however, the longer stapled merino wools, from 2.5 to 3 inches in length, were being combed for making delaines and similar fabrics. Other changes and improvements in combing machinery came into use, the fashion for bright goods waned, the development of the worsted suiting industry came on, and it supplied itself with combing wools of merino blood. The reign of the long combing fleeces was over, and they began to fall in value as rapidly as they had risen. The effect of these mutations in the industry upon that class of wools may be judged from the London quotations of Lincoln wool, which fell from 25.75 pence in 1865, a price which it reached again in 1872, to 10 pence in 1890.

Between 1860 and 1870 the number of establishments manufacturing worsted goods increased from 3 to 102, the capital from $3,230,000 to $10,085,778, the operatives from 2,378 to 12,920, and the value of products from $3,701,378 to $22,090,331. The decade from 1870 to 1880 showed the number of worsted manufactories reduced to 76, but the amount of capital employed doubled, and the market value of the products increased from $22,090,331 to $33,549,942.

The decade now under consideration shows a ratio of gain greater than any other. The number of mills just about doubled, the capital increased more than three times, the total number of employés more than doubled, and the value of the products increased 136.05 per cent. While the relative importance of the worsted industry in this country is not yet as great as in either England or France, it is nevertheless clear that this is the department of wool manufacture for which the future holds the greatest promise.

DRESS GOODS FOR WOMEN'S WEAR.

The sketch above given indicates that the worsted manufacture was confined for many years to the making of the light-weight goods for female wear, commonly grouped under the name of "stuffs" or dress goods, except as to the manufacture of coarser worsted yarns for use in the carpet industry. All the products of this general class are grouped under this one head as the only practicable classification where there exists such a multitude of names and varieties of fabrics. The census of 1890 shows the manufacture of 73,907,259 square yards of goods of this general character, having a total value of $16,328,836. The quantity of running yards manufactured in 1880 was 75,109,225. An increase in quantity occurred, as the great bulk of the dress goods are manufactured in narrow widths, running from 26 up to 54 inches, but averaging perhaps somewhere between 30 and 40 inches. The increase in the manufacture of suitings for men's wear has, however, been much greater, both in value and quantity.

One explanation of this fact is found in the enormous quantities of dress goods imported into this country of late years. The following table, prepared from the Treasury Department reports, shows approximately the quantity of this class of imported goods consumed by the American people since 1867:

IMPORTS OF DRESS GOODS ENTERED FOR CONSUMPTION: 1867–1890.

[Goods weighing over 4 ounces per square yard estimated at 4.5 ounces to the square yard.]

YEARS.	Square yards.	Foreign value.	YEARS.	Square yards.	Foreign value.
1867	68,845,745	$20,356,635	1879	54,982,153	$14,365,255
1868	67,035,850	16,868,362	1880	67,986,246	16,752,068
1869	68,941,611	18,280,490	1881	61,990,172	15,961,066
1870	68,417,235	18,044,982	1882	93,772,856	19,070,817
1871	80,857,310	21,651,423	1883	93,920,152	22,619,106
1872	81,213,343	24,071,332	1884	63,831,494	15,349,097
1873	75,696,005	23,119,442	1885	61,491,520	14,197,987
1874	73,489,162	22,363,759	1886	67,346,150	14,971,277
1875	77,026,496	22,330,018	1887	76,871,189	17,199,141
1876	60,234,205	16,555,100	1888	85,504,490	18,742,493
1877	52,912,741	14,111,843	1889	93,261,526	19,793,253
1878	53,002,154	14,164,130	1890	107,915,289	22,668,293

When to the quantity given for 1890 in this table we add the 73,907,259 square yards of domestic manufacture, we have the enormous total of 181,822,548 square yards. Of the imports above given the great bulk were of so called worsted dress goods (but including linings and Italian cloths, by reason of the tariff classification). Adding to the above total the carded wool dress goods manufactured in the United States we again increase our total to 234,608,118 square yards of material manufactured at home and abroad for the clothing of American women.

These statistics show that the imported supply of worsted dress goods and linings is considerably in excess of the domestic manufacture, which is true of no other branch of the wool manufacture. This class of goods constituted in 1889 about 37 per cent of the total imports of woolen goods of every class and description. The foreign value of these imported dress goods in 1890 was $22,668,293, and their duty-paid value was $39,159,241, as against a value of $15,821,087 of domestic wool dress goods, $16,328,836 of domestic worsted goods, and $1,255,520 of domestic Italian cloths, linings, etc., the total value of the kindred domestic productions being $33,405,443, showing that the duty paid value of the import of these goods exceeded the mill value of the domestic production of similar goods by the sum of $5,753,798.

The imports of dress goods are separately classified as part wool or cotton warp goods and all-wool goods. The average foreign value of the cotton warp dress goods imported in 1890 was 20 cents per square yard, their duty paid value 33 cents. The average foreign value of the all-wool dress goods imported was 20 cents per square yard, and their average duty paid value 38 cents per square yard. The average value at the mill of the domestic products in worsted dress goods in 1890 was 22 cents, which maintains a striking relationship to the average foreign value of the imported competing goods, and is 16 cents less than the average duty paid value of these goods. The American manufacturers have of late years practically supplied the home market for the cheaper grades of mixed dress goods. The importations of these grades consist largely of novelties, in the production of which the Bradford manufacturers are particularly expert.

The further analysis of the domestic production of worsted dress goods divides them into 11,349,319 square yards of all-wool goods, valued at $3,905,398, an average value per square yard of 34.41 cents; and 62,557,940 square yards of cotton warp or mixed dress goods, valued at $12,423,438, an average value of 19.86 cents per square yard. It is clear, therefore, that the domestic production of all-wool dress goods does not yet equal one-sixth of the average annual consumption of the American people.

But even this proportion indicates a very decided gain, which was almost wholly secured within the decade between 1880 and 1890. It was not until a few years ago that our manufacturers ventured to attempt this manufacture, except experimentally, the trial usually demonstrating the impossibility of competing to advantage with the French in a field which they have made peculiarly their own and in which they meet with only desultory competition from the manufacturers of other European nations. The products of their mills are recognized throughout the world as inimitable, so far as artistic pattern and dyeing are concerned, and exhibit a perfection of finish which stamps them as the most perfect fabrics in the whole range of the textile industry.

In entering this field American manufacturers have had to contend with the strong popular prejudice in favor of the French goods, and with the problem of reconciling prices with much greater labor cost. The proportion of labor cost increases in an inverse ratio as the size of the yarn becomes finer. Thus the operative who can spin 60 pounds a day of the yarns known as 40's is reduced in his production to say 30 pounds when spinning 60's, and to 15 pounds if he spins 80's. The capacity of the machinery is reduced in the same manner. That is to say, there will be twice as many yards of yarn to a pound for 40's as for 20's, and as each yard has more turns of twist

per inch in 40's than in 20's the production per frame in pounds is much smaller for 40's than for 20's. Considerations of this character are of prime importance in determining the question whether we are likely to succeed in domesticating the important industry of fine all-wool dress goods. In the meanwhile the census of 1890 shows remarkable progress in this direction, a progress which has since become even more marked. The goods of this description made by several of our leading worsted mills reveal a taste in their conception and a care and delicacy in their finish which permits them to sell in the markets side by side with the French stuffs.

WORSTED GOODS FOR MEN'S WEAR.

This report has thus far spoken only of the history and statistics of the worsted manufactures of the United States in their relation to the lighter fabrics adapted to women's wear. The development of the other branch did not begin until more than twenty years later, but so rapid has been its progress that in 1890 the value of its products was nearly double the value of the products of the dress goods mills.

There is some confusion as to the exact time and place when and where this manufacture began in the United States. Mr. John L. Hayes is authority for the statement that the first merino worsted coatings made in the United States were turned out by the Washington mills in 1870, under the inspiration of the late E. R. Mudge, who had been a United States commissioner to the Paris Exposition of 1867, and had been much impressed with specimens of these goods of French origin there exhibited. On the other hand, it is equally certain that similar fabrics were made at the same time by the Hockanum Company, at Rockville, Connecticut, and the Wauskuck mills in Rhode Island also commenced the manufacture of worsteds about 1870.

Mr. Henry G. Kittredge, the editor of the Boston Journal of Commerce, writes as follows on this point:

> From the treasurer's annual report to the Washington mills' stockholders, December 24, 1868, we learn that in 1864 two combing machines, with necessary preparing and spinning machinery, were purchased for making worsted yarns. With this machinery the mills experimented on various fabrics with more or less success until 1868, when, in the words of the report, "an article of very general utility was perfected" for which new worsted machinery was bought, also looms of new and improved construction for the manufacture of goods which had been before wholly imported, thus diversifying the product of the mills and adding one more and a very important branch to American industry. We have indisputable evidence that about the middle of 1869 light weight (12 oz.) worsteds were being manufactured in quantity, made from 2-60 yarn for warp and filling. It was not till the latter part of 1870, or the early part of 1871, that heavy weights were begun to be manufactured by these mills.

It was many years before our manufacturers began to seriously compete with foreigners in this class of goods. The expensive machinery required to manufacture the yarns employed was one obstacle in the way of a more rapid development, and another was the tariff discrimination in the act of 1883 against this class of goods. The tariff of that year, like all previous tariffs, was apparently arranged on the theory that the worsted manufacture was confined to "stuff" goods, so called, for women's wear, to which it was wholly limited prior to 1870. Worsted cloths were entered at rates of duty so much lower than those applied to cloths made of carded wool that the domestic market was chiefly supplied from foreign mills. The development of the worsted industry was retarded by these conditions; but the popularity of these fabrics increased so rapidly that many mills adapted their machinery to its production. The former fancy cassimere makers especially were ready to adopt a fabric which was well adapted to their looms and required but little change in their machinery beyond the substitution of combs for cards. But in most cases they purchased their worsted yarns from the great combing and spinning establishments which sprang up. The making of worsted cloths thus practically became an adjunct, not of the original worsted industry, but of the woolen cloth manufacture.

It is worthy of note that the first important movement toward the specialization of the wool manufacture in this country, after the method which distinguishes it in France and England, dates from the introduction of the worsted cloth manufacture, and about the year 1870. Up to that period the worsted manufacture had been chiefly carried on in mills possessing all the appurtenances necessary to turn out the completed product from the raw wool to the finished goods. It is true there existed a few mills prior to this date engaged solely in yarn spinning, and particularly carpet, zephyr, and hosiery yarns. But the real development of worsted spinning as a separate industry has occurred since 1870.

The quantity of worsted cloths of all descriptions produced during the census year was 28,469,887 square yards, valued at $32,299,578, as compared with 5,726,994 running yards produced in 1880, and reported in the census of that year under the heads of coatings, suitings, and overcoatings among the products of both worsted and woolen mills. These figures show how enormous has been the increase in the consumption of this class of goods. The quantity is still, however, much smaller than the production of woolen cloths for similar wear, which was 127,109,190 square yards.

BUNTING.

Up to the close of the civil war all the bunting used in the United States was manufactured in England, where it was made of the long combing wools peculiar to that country. In 1865 the United States Bunting Company was organized at Lowell, Massachusetts, and at once successfully achieved the manufacture of this important fabric; and this establishment, together with the New England Bunting Company, located in the same city, now supply practically all of this material used in the United States. They have shown great skill, not only in the manufacture of the materials of which our national flags are made, but also in the construction of the flags themselves.

The total quantity of bunting made in 1890 was 566,880 square yards, valued at $135,983. Practically the whole of this production was used for flags.

The census of 1880 reported 2,230,221 running yards of bunting manufactured in worsted mills in that year and 355,000 running yards manufactured in woolen mills. In explanation of these larger figures it may be said that at the time the census of 1880 was taken a material known as bunting was very popular as a wearing apparel for women, and the great bulk of the product reported was used for that purpose. The fashion then in vogue no longer obtains, or, if there is still a limited quantity of the fabric made for this purpose, it is now included in the worsted dress-goods products of 1890.

WORSTED BRAIDS.

The manufacture of worsted braids in this country was successfully established in 1861, at Pawtucket, Rhode Island, by the late Darius Goff, who began with six braiding machines. Experimental efforts had preceded Mr. Goff's venture, but his was the first establishment to persist in the enterprise until it was crowned with success. The machines for braiding in use in this and other mills were of American invention, made expressly for the purpose, and they were great improvements over those then employed in England, being much simpler and requiring about half the power to operate them.

The quantity of braids and braiding is reported in running yards. The quantity and value of these goods, the location of the establishments making them, and the number of braiding machines employed are shown in the following table:

STATES.	Number of establishments.	Yards.	Value.	Number of braiders.
Total	11	104,205,251	$1,264,622	.....
Massachusetts	2	20,085,888	266,001	2,400
New York	3	26,537,240	338,000	4,300
Rhode Island	5	40,856,750	545,249	4,050
Pennsylvania	1	16,725,373	115,372	.....

In 1880, braids were reported by dozens of pieces to the number of 2,612,691 dozens. The increase in the production has been enormous in the ten years, and the domestic market is practically supplied by the home product.

PLUSHES AND PILE FABRICS.

An important branch of the worsted manufacture, the manufacture of mohair plushes and other similar pile fabrics for upholstery purposes, has been successfully established in this country since the census of 1880 was taken. Three mills were equipped for this specialty very nearly contemporaneously about 1882, that of the Tingue Manufacturing Company, at Seymour, Connecticut; D. Goff & Sons, at Pawtucket, Rhode Island, and the Goodell Brothers, of the Sanford Mills, in Maine, who established the manufacture of plush carriage robes and velours in this country in 1867. Great embarrassments attended the establishment of the upholstery plush manufacture in this country on account of the difficulty in obtaining the proper weaving machinery. The manufacture of mohair plushes was confined at that time to France and Germany, where the peculiar looms employed were kept under the closest surveillance. Repeated attempts to procure this machinery abroad were baffled, and the result was the invention of American patterns, of which different mechanisms were evolved by each of the establishments named. Mr. Goff's loom, originally based upon an English patent, was finally, after five years of experiment, perfected on an entirely novel plan, and these looms now produce a fabric in every way equal to the best plushes made abroad, and with much greater economy of labor. The product of these and other mills is now sufficient to practically supply the domestic market, which is very large, not less than 3,500 railway cars being annually upholstered with their goods.

The success of the experiment in plush manufacturing has been followed by an extraordinary development in the production of a great variety of pile fabrics and kindred goods for upholstery and house decoration purposes. The artistic element has had ample field for play in these products, and the evidences of originality and the power to create striking effects which are shown in many of these goods have brought the American textile manufacture suddenly and favorably into the notice of the world. This has been particularly the case in what are known as chenille goods, largely used for household decoration. Cotton is the fiber chiefly used in these goods, and with a few exceptions they have been returned to the census under that branch of manufacture. Silk and worsted are used to a large extent in the making of the higher grades of these fabrics, and the manufacture has grown so rapidly since 1880 that it may hereafter be properly recognized as a distinct branch of the textiles, to be separately treated, and one which holds out the highest promise and opportunity for the future.

CLASS III—CARPETS.

The manufacture of carpets is regarded as the most characteristic branch of the textile industries of the United States. Two causes have contributed to the unique development of this branch of the wool manufacture.

One was the extraordinary contribution of American invention to the mechanism of carpet manufacture, exceeding in value and importance those of all other nations combined. Another is the general prosperity of our people and the high wages earned, permitting families in all grades of life to indulge in the luxury of floor coverings, and creating a large and lucrative market.

In this respect mechanical manufacturing has effected a great change in the comfort and habits of our people. Up to the middle of the last century a carpet was a curiosity even in the homes of the wealthy. Such as existed were chiefly of the variety known as rag carpets, made then as now in the family. The first carpet manufactory of whose existence in this country there is any record was established in Philadelphia in 1791 by William Peter Sprague. The census of 1820 reported small quantities of wool carpeting woven by hand at Newport, Rhode Island, in Queens county, New York, and in Frederick county, Maryland, but this was presumably rag carpeting. In 1825, Alexander Wright, a native of Scotland, started a small carpet mill at Medway, Massachusetts, which he operated for a time with hand looms brought from Scotland. After passing through several hands the mill and machinery were sold in 1825 to the Lowell Manufacturing Company, then recently organized for the manufacture of carpets and cotton goods, and when the Lowell mill was completed the machinery was removed to that city. The origin of that great establishment is thus definitely fixed. Very shortly the Lowell Company was running 70 carpet looms, and producing weekly 2,500 yards of ingrain, brussels, and other carpeting, and 150 rugs. The census of 1860 records that in 1830 a manufactory of imitation brussels and ingrain carpets was started at Carlisle, Pennsylvania; that in 1833 there were three carpet mills in operation in Columbia county, New York, and large mills at New Haven, Connecticut, and Norwich, Connecticut, and that by 1834 there were in operation at least 511 hand carpet looms in from 18 to 20 mills. Upon these looms were made annually 21,600 yards of brussels, 31,500 yards of 3-ply ingrain, 954,000 yards of other ingrain, 132,000 yards of venetian, and 8,400 yards of damask venetian, a total of 1,147,500 yards, having an average value of $1 a yard. This production has since multiplied more than 70 times. At the same time many families were supplying themselves with rag carpeting made at home, and the quantity of rag carpets made in the household for sale was much greater than at present.

Mr. Hayes wrote that it was within his personal recollection that at about the same time the manufacture of ingrain carpets was undertaken at Great Falls, in New Hampshire, by power, the apparatus for making the figure automatically being a large cylinder or drum, upon which pins or blocks were placed corresponding to the pattern to be woven, the cylinder operating like that of a music box. This apparatus was also used at Little Falls, in New Jersey. This, as well as other automatic devices elsewhere tried, was finally abandoned, as operating less favorably than the hand loom. In 1844 the hand loom, both in Europe and this country, was universally used for making carpets.

The real development of our carpet industry dates from the successful application of power to the carpet loom, as the result of experiments and inventions made by Erastus B. Bigelow, of Boston, Massachusetts. Many improvements had in the meanwhile been made in the hand loom, and several patents were issued to manufacturing American inventors. Up to the time when Mr. Bigelow succeeded in making the carpet loom automatic the English machinery was superior to our own, and the jealousy with which it was guarded made it impossible for American manufacturers to equal the carpets then imported from England in much larger quantities, relatively, than has since been the case.

In co-operation with Mr. George W. Lyman, treasurer of the Lowell Company, who supplied the funds, Mr. Bigelow worked out the device he had conceived, and by 1844 the successful weaving of ingrain carpets by power had been achieved at Lowell. From that point the history of the ingrain carpet manufacture in this country has been a record of constantly extending development. The Hartford Carpet Company, next to the Lowell the earliest organized of our large carpet manufactories, at once adopted Mr. Bigelow's invention under arrangements with the patentees, and other establishments followed suit.

Mr. Bigelow next devoted his energies to the invention of power looms for weaving jacquard brussels and wilton carpets. The results of his labors being offered to the Lowell Company and not accepted, Mr. Bigelow established a factory of his own at Clinton, Massachusetts, which was organized into the Bigelow Carpet Company in 1854, and became the largest establishment in the world, uniting under one management all the processes of spinning, dyeing, and weaving jacquard brussels, and wilton carpets. The supplemental report of the jury at the London Exposition of 1851 declared that the specimens of these classes of carpets exhibited by Mr. Bigelow were "better and more perfectly woven than any hand loom carpets that had ever come under the notice of the jury". This, however, was but a small part of their merit, or rather that of Mr. Bigelow, "who has completely triumphed over the numerous obstacles that presented themselves, and succeeded in substituting steam power for manual labor in the manufacture of five frame brussels carpets".

English manufacturers were quick to appreciate the importance of this invention, and an arrangement was made by Crossley & Sons for placing the new looms in their immense establishment at Halifax. Subsequently

this company purchased Mr. Bigelow's patent rights for the whole of the United Kingdom. The right to use his patents was sold to a few mills in the United States, and until their expiration the manufacture of these particular carpets was confined to these mills.

Still another of Mr. Bigelow's inventions was for weaving tapestry carpets, so called. This style of carpet, known both as tapestry brussels and tapestry velvet, of comparatively recent invention, is now extensively manufactured both in England and the United States. It is particularly adapted to meet the demand for brilliant effects at popular prices; for there is no form of carpet where so handsome an appearance can be secured at so low a cost. In all other carpets the yarns are dyed, and the process of arranging these many colored yarns for the loom, to work out an elaborate pattern, is slow and expensive. In the tapestry carpet the colors are printed upon the warp threads in such a manner that when the warps are woven they form the desired figure. The room for the application of color and design is therefore unlimited. This method of printing the warps, originally invented by a Scotchman about 1832, was perfected by John Crossley, of Halifax, in 1842. It was first undertaken in this country by John Johnson, at Newark, New Jersey, in 1846, with 25 hand looms. This establishment was subsequently removed to Roxbury, Massachusetts, where the inventive genius of Michael M. Simpson brought the manufacture to the highest state of efficiency. A number of our largest carpet mills are now employed in the manufacture of tapestries. The progress made in this manufacture is attested by certain records kept by the Roxbury Company. The product of the first hand looms was but 5 yards per loom per day. In 1856 the product of each power loom in these mills was 16 yards. In 1876 the average product of each of 114 looms was 49.5 yards per day, and this average has since been slightly increased.

The American manufacture of Axminster carpets, the most luxurious carpet that comes from the power loom, and previously manufactured only in France and England on hand looms, dates only from the year 1867. A patent for weaving these carpets by power was awarded to Alexander Smith and Halcyon Skinner in 1856; but the destruction of their factory by fire, and other obstacles, prevented its utilization until 1867, since which time the product of their mill has in some years equaled the entire annual production of these high grade carpets in France and Great Britain.

The census record of the statistics of carpet manufacture begins with 1850, and its subsequent growth by ten-year periods is epitomized in the following table:

STATISTICS OF CARPET MILLS: 1850–1890.

YEARS.	Number of establishments.	Capital.	Miscellaneous expenses.	Average number of employés.	Total wages.	Cost of materials used.	Value of products.
1850	116	$3,852,981	.....	6,186	$1,246,560	$3,075,592	$5,401,234
1860	213	4,721,768	.....	6,681	1,545,692	4,417,986	7,857,636
1870	215	12,540,760	.....	12,098	4,681,718	13,577,993	21,761,573
1880	195	21,468,587	.....	20,371	6,835,218	18,984,877	31,792,802
1890	173	a38,208,842	$1,819,441	29,121	11,633,116	28,644,905	47,770,193

a This amount does not include the value of "Hired property".

Although there has been a decrease in the number of carpet manufacturers reporting from 195 in 1880 to 173 in 1890, there has been a very marked increase in the capital, in the number of employés, in the amount of wages, and in the quantity and value of products. The number of sets of cards increased from 285 to 392. The number of combing machines decreased from 155 to 118, indicating the great increase in the purchase of yarns by weavers of carpets who find it to their advantage to have their worsted yarns spun for them. Of the combing machines credited to the worsted manufacture in this report a large number belong strictly to the carpet industry, since they are engaged exclusively in making yarns of the numbers 12 to 17, employed only by the carpet manufacturers. They were probably so credited in 1880. The number of spindles employed in the carpet manufacture proper was 208,858, of which 53,046 were woolen, 151,132 worsted, and 4,680 cotton spindles. In 1880 the number of woolen spindles was 32,853, and 82,256 worsted spindles.

These statistics of the spinning machinery of the carpet manufacture are no clew whatever to its status. To a degree unknown in any other branch of wool manufacturing the carpet weavers purchase yarns from spinners whose machinery and product are necessarily classified in this report either with the woolen or the worsted mills. In the city of Philadelphia, where there were 133 carpet mills reporting out of the 173 in the whole country, there were only 12 establishments which spun their own yarns. The decrease in the number of combing machines between 1880 and 1890 shows that this specialization of the industry is rapidly increasing. The loom is therefore the only true guide to the mechanical growth of this industry.

The total number of looms employed in carpet mills has increased from 7,252 in 1880 to 11,235 in 1890. This increase shows the rapid transfer of this industry from the hand to the power loom, the hand looms employed decreasing from 3,995 in 1880 to 2,697 in 1890, and the power looms increasing from 3,257 in 1880 to 8,538 in 1890.

The change from hand looms to power looms did not begin to become general in Philadelphia, the great seat of the industry in the United States, until about 1873. The hand looms had been invariably worked by men; the power looms are almost as generally operated by women, and consequently the increase in production, equaling about 100 per cent, was accompanied not only by a decrease in actual labor cost, but also by a decrease in the wages of weavers. The earnings of power loom weavers have never reached the standards paid to hand loom weavers, although they have been steadily tending upward since 1873.

The substitution of the power loom has proceeded much more rapidly in the United States than elsewhere. Indeed, the carpet manufacture may still be called a hand manufacture, except in the United States. F. H. Wigfall, United States consul at Leeds, reports the number of looms in that district, which is the chief center of the English carpet manufacture, as 1,166 in 1889, of which all but 60 were hand looms. At Tunstall, where the ingrain carpets are chiefly manufactured, the proportion of power looms is no greater. The persistence in the use of the hand loom is explained by Mr. Shoenhof, in a consular report, as due to the fact that the cost of production is nearly the same in both cases, "and hand loom weaving offers to the manufacturer the advantage that he need not sink the greater part of his capital into fixed charges of costly machinery". The hand looms generally belong to the weaver, who is supplied with yarns by the manufacturer, who may thus be a person owning no machinery or buildings of any kind. A hand loom in England costs £13 or $63, while a power loom costs £120 or $580, and a good hand loom weaver will turn out about 60 yards of ingrain carpet per week. Several of the English manufacturers who have introduced the power loom have been successful, and a change similar to that which has occurred in the United States must eventually take place in Great Britain, the experience of this country demonstrating beyond question that it is the most advantageous method of manufacturing.

In the present census there has been secured a closer subdivision of the number of looms employed upon each variety of carpets than has heretofore been made. The number of ingrain power looms has increased from 1,873 to 4,214; the number of brussels power looms from 756 to 1,224, and the number of tapestry brussels looms from 547 to 1,498.

There has been an increased production from this increased weaving machinery very nearly commensurate with the enlarged capacity thus indicated, as is shown by the following table, in which the relative quantities of the different varieties of carpets manufactured in 1890 and 1880 are set forth in detail:

CARPETS.

YEARS.	Total carpets (running yards).	Ingrain, 2-ply (square yards).	Ingrain, 3-ply (square yards).	Ingrain art (square yards).	Venetian (running yards).	Body brussels (running yards).	Tapestry, brussels (running yards).	Tapestry, velvet (running yards).
1890	74,770,910	32,918,659	3,251,308	553,513	.....	9,442,348	20,008,961	2,482,128
1880	39,282,634	21,986,434	862,394	.....	1,984,201	4,077,190	9,441,195	60,000

YEARS.	Wilton (running yards).	Axminster (running yards).	Moquette (running yards).	Smyrna (square yards).	Cottage (square yards).	Dutch (square yards).	Rag (square yards).	All other (square yards).
1890	1,030,101	379,341	3,193,186	127,177	.....	.....	71,310	1,312,818
1880	157,029	303,366	.....	.....	241,220	12,000	157,005	.....

The ordinary ingrain carpet width is one yard, but other carpets are usually made three-quarters of a yard in width. These figures show an increase of about 90 per cent in the production of carpets.

The increase in the manufacture of rugs and art squares is even greater than in carpets. In 1880 the census reported the manufacture of 40,000 separate druggets. In 1890 the druggets are reported in square yards, of which there were 103,258 square yards manufactured. In rugs of all descriptions there were made in 1880 47,530, and in 1890 1,563,303. Many of our largest manufacturers turned their machinery largely to the making of rugs, in response to the popular taste for partially covered floors. The greater part of this manufacture was of the cheaper grades, but the product also contained many rugs of a very high quality of material and workmanship, commendable for the skill and taste displayed in coloring and pattern. While these American rugs do not take the place of the eastern hand made rugs, which remain unrivaled by the products of machine manufacture, they easily stand the test of comparison with any similar work done in Europe.

Just before the census year the setting and weaving the patterns of Smyrna rugs by power looms was successfully achieved in Philadelphia. The patent for this loom became the subject of litigation, and the finding of the court was singular in this, that it states the conception of setting Smyrna rugs by power occurred about the same time to three different persons, namely, Joseph H. Bromley, of John Bromley & Sons; Thomas Bromley, jr., of the Bromley Brothers Carpet Company, and George W. Stewart, of John Stewart & Son. Looms constructed after plans made by each of these gentlemen were in actual operation during the census year. These looms are provided with a double shuttle-box on each side, and a mechanism which stops the loom after every two picks, and another by which it

may be started again by the foot. The Smyrna rug or carpet is a double-faced fabric, one side being the fac simile of the other. They are woven with one warp and two wefts, one of the latter consisting of coarse jute, the other of party-colored twisted chenille, a thread of each being shot or thrown alternately. After each weft of chenille is shot, it is necesssary for the weaver to set or adjust it with reference to the preceding weft of chenille, so as to form the figure, and to accomplish this the loom must be thrown out of action, after every second shot or pick. The mechanism above described successfully accomplishes the stopping and starting of the loom for these purposes. Before 1889 none of these carpets or rugs were made except upon hand looms; and of the 127,177 square yards of carpets reported as manufactured in the census year, almost the whole were of hand manufacture. The first Smyrna carpets manufactured in the United States date from about 1877, and the quantity made in 1880 was so small that they were not separately reported.

The American carpet manufacturers have won the command of their home market in all grades and styles of carpets, except the hand-made rugs referred to. The importations have fallen steadily, until in 1890 they comprised less than 600,000 square yards, valued at $1,564,890, nearly the whole of which quantity consisted of eastern hand made rugs. They have been aided in this achievement by the skill and good taste they have shown in the preparation of patterns and colors and by loyalty to the requirements of high art. Some deficiencies in dyeing, which interfered with the popularity of their high grade products in the earlier years, have been entirely overcome. The American industry as it stands to-day has a capacity to supply every variety of carpet required to meet every possible want, from the rich and luxuriant wilton and axminster, of limited demand and high price, through all the medium grades to the sightly and useful carpet, composed of the cheapest materials and adapted to the most modest homes.

Of the total product of carpets reported in 1890 the state of Pennsylvania produced 44,198,175 square yards, or 55.10 per cent.

CLASS IV—FELT GOODS.

The felt manufacture has been one of the distinctive features of the industry in the United States, although the volume of its products is small compared with those we have been considering. It was first separately enumerated in 1880, and the growth of this branch in the interval is shown in the following table:

STATISTICS OF FELT MILLS.

GENERAL HEADS.	1880	1890
Number of establishments	20	34
Capital	$1,958,254	a$4,460,621
Miscellaneous expenses	.....	232,871
Average number of employés	1,524	2,266
Total wages	$439,760	$1,041,296
Cost of materials used	$2,530,710	$2,809,937
Value of products	$3,619,652	$4,654,768

a This amount does not include value of "Hired property".

The products of felt manufacture constitute an almost innumerable variety of articles. The largest single item is felted cloths, of which 2,628,546 square yards are reported, valued at $986,888. These cloths are used for a great variety of miscellaneous purposes other than clothing, into which they do not largely enter, except as skirts and skirting. They were among the earliest forms of wool manufacturing attempted in the United States, Mr. Thomas R. Williams, of Newport, Rhode Island, having succeeded in inventing about 1820, the process of making felt cloth of commercial length, which he patented in England in 1830, and which was subsequently successfully operated in the Bay State mills at Lawrence, under exclusive rights, for many years. The exceptions to this monopoly were a fabrication of felt cloths, conducted in Norwich, Connecticut, under the Bishop patent, and the manufacture of hat bodies, conducted under the Wells patent. It is an interesting historical incident that this simple method of working wool, which was undoubtedly the earliest form of the manufacture in antiquity, should have passed almost wholly into desuetude until it was revived and perfected by one of our own countrymen, M. Koeppelin, a French expert, writing in 1869, made the following allusion to the subject:

> In spite of the simplicity of its fabrication, and in spite of the antiquity of its origin, felting was for a long time abandoned to the lesser industries. It is only within thirty years that the mechanical fabrication of felted cloths has been essayed. Many fruitless attempts were made in this direction in France and in other countries, and it is only to the inventive genius of two Americans, Wells and Williams, that we owe the processes now in use, and which have not been materially modified since the epoch of their discovery.

These processes were at once applied in France and England, and they are now extensively employed in the latter country in the manufacture of printed felt carpetings, which are exported to all parts of the world and are popular because of their comparative cheapness. The production of these felt carpetings is relatively small in this country, 185,338 square yards being reported under the head of druggets, with a value of $91,742, their place being supplied by the cheaper grades of ingrain carpeting. Other forms of goods produced in the felt mills are

table and piano covers, hat felts, saddle felts, and rubber shoe linings. The miscellaneous products of the industry which are not separately enumerated include felt slippers and shoe soles, sheathing materials, polishing felts, for polishing furniture and marble, etc. There is an almost infinite variety of forms into which felted wool is manufactured, and nearly all of them are successfully conducted in this country, though generally on a small scale.

One highly important form of felt manufacture which has been successfully introduced since the last census by Alfred Dolge, at Dolgeville, New York, is the making of piano felt, for piano keys, an industry which was previously confined to two factories in England, two in France, and four in Germany.

Another considerable product of the felt mills are the endless belts used as blankets for paper making machines. This material is a woven fabric, very highly felted to produce strength and endurance, and it requires great care and nicety in its manufacture. 216,982 square yards of this blanketing was produced in the census year. The census of 1880 made no return whatever of these blankets; and, as a matter of fact, there were but few of them made in this country at that time, the paper manufacturers finding that the American blankets were inferior to those made in Germany, where practically all of these blankets were made up to a recent period. Since the manufacture was begun in good earnest in this country constant improvements have been effected in this class of goods, which have indirectly resulted in marked reductions in the cost of paper. The domestic production of these blankets is already largely in excess of the imported quantity. A single decade has therefore sufficed to enable our manufacturers to conquer this branch of the industry.

CLASS V—WOOL HATS.

The manufacture of wool hats has always been an important branch of our domestic wool manufacture. In his tables, prepared on the basis of the returns of the census of 1810, Tench Coxe reported the value of "hats made of wool, fur, etc., with mixtures of them", to be $4,323,744. Of this production about $100,000 was exported, and as the importation of hats of all kinds were then valued at but $350,000, it will be seen that the industry then occupied a unique position and possessed a relative importance among the occupations of the people which it long since lost. The industry was at that time essentially a household one, and was one of the last branches of the wool manufacture to adapt itself to factory conditions.

Up to about 1822 each locality had, in addition to its sawmill, gristmill, store, and blacksmith shop and shoemaker's shop, the hat shop, in which the boss hatter, with one or two apprentices, manufactured hats for the surrounding district. This primitive establishment latterly obtained its supply of stock from the city merchants, who furnished the carded wool, the web being wound on a drum, thus forming a bat or lap, as it was sometimes called, or by allowing the web to fall directly on the floor. The wool was manipulated by the hatter by means of the bow and bowstring, which was skillfully applied to the carded wool until it was flattened out into a hat of irregular form; then, by ingenious handling and putting a number of the bats together, the hat body in conical shape was finally formed. In 1822 a machine was invented for forming wool hat bodies. This machine operated by winding the web from the doffer directly upon the cone and forming one body at a time, the web being wound straight around the cone without crossing. Three years later the double cone former, which crosses the web by a vibrating motion and runs it from one end of the cone to the other, at the same time revolving on conical cylinders and covering the entire cone, was invented and patented. This machine, with many improvements, is still in use. Various other machines, also designed to form hat bodies automatically, were invented in subsequent years by American mechanics, and the factory manufacture of wool hats soon deprived the local hat maker of his occupation. A marked reduction in cost was effected and the consumption greatly increased in consequence. Between 1830 and 1840 a number of hat manufactories came into existence and steadily increased their facilities for production. The hand manufacture of hats had been obliged to use lamb's wool only, as the bowstring would not work except upon the straight fiber of the lamb's fleece. With the machine manufacture wool of any kind sufficed, provided it possessed the requisite felting qualities. From 1830 to 1845 the fine German Saxony lamb's wool and also the fine Spanish wools were largely used for hat bodies as possessing the best felting qualities. The wool hat manufacture had been subject to the vicissitudes of fashion more disastrously, perhaps, than any other branch of the industry. The silk hat, when it first made its advent about 1845, nearly prostrated the wool hat industry, especially those establishments which had been engaged in making the finer qualities, napped with fur. At a later date the development of the fur hat industry affected the wool hat manufacture even more seriously, and the effect of the competition is strikingly shown in the present statistics.

The statistics of the industry have been very irregularly reported in the census, owing to the fact that the increasing use of other materials than wool has made it less and less distinctively a branch of the wool manufacture. Prior to 1860 no separation was attempted. From the census of that year it appears that the industry consumed 3,039,700 pounds of wool and 1,658,520 pounds of fur, and produced 6,191,482 wool hats and 2,462,974 soft or felt wool hats, as compared with 2,449,672 fur hats. At no subsequent census has the number of wool hats equaled the number of fur hats manufactured, and the latter now greatly predominate.

The census of 1870 made no separate return of wool hats, but included them among the 483 establishments making hats and caps of all descriptions, to the value of $24,848,167. The trade data for that year indicate that there were then about 300 sets of 24-inch cards employed in the United States in the manufacture of wool hats, with a daily capacity of 15 dozen hats to the set. The census of 1880 showed 362 sets of cards employed in the industry, manufacturing 1,391,862 dozen wool hats, value not separately given. The census of 1890 shows the number of sets of cards reduced to 229, and the product of wool hats reduced to 972,475 dozens, valued at $4,612,151, or an average value of $4.74 per dozen. These figures illustrate the manner in which the wool hat manufacture has suffered from the competition of the fur hats, made originally from the fur of the beaver, and since that disappeared, from the fur of rabbits, hares, kangaroos, and similar animals.

The wool hat manufacture is thus rapidly being superseded by that of fur hats, as may be inferred from the following comparative table:

STATISTICS OF WOOL HAT MILLS: 1880 AND 1890.

YEARS.	Number of establishments.	Capital.	Miscellaneous expenses.	Average number of employés.	Total wages.	Cost of materials used.	Value of products.
1880	43	$3,615,830	.....	5,470	$1,893,215	$4,785,774	$8,516,569
1890	32	a4,142,224	$249,568	3,592	1,363,944	2,802,041	5,329,921

a This amount does not include value of "Hired property".

These figures do not mean that the manufacture of hats has fallen into decadence in the ten years, but simply that the fur hat is superseding the all wool hat in popular favor. In consequence many of the mills formerly engaged exclusively in the wool hat manufacture now produce chiefly of the other variety, and the statistics of their mills have therefore been transferred to the other industry. In the materials consumed in the manufacture of fur hats is included a large quantity of wool, the record of which is lost to this inquiry.

CLASS VI.—HOSIERY AND KNIT GOODS.

Not unlike the worsted manufacture in the rapidity of its development, and almost equaling it in the value and volume of its products, is the manufacture of hosiery and knit goods. The knit goods industry did not exist in this country as a branch of manufacture, properly so called, until 1832, when the principle of knitting by power was first successfully attained at Cohoes, New York, by Egbert Egberts. His machine was simply the square stocking frame of William Lee adapted to power. It produced a stocking web 28 inches wide at the rate of one inch per minute, which was cut off at proper lengths and shaped and seamed to form the stocking. The cost of manufacture was thus reduced to nearly one-tenth of what it had formerly been, and the enormous possibilities of the new industry were at once foreshadowed. It inaugurated a revolution in the character of underwear. Practically all this wear had been, up to that time, flannel goods, specially manufactured for that purpose, and fashioned and sewn at home, according to the individual needs. How nearly universal has become the use of knitted undergarments, how much more extensive has become the use of underwear, how vastly the comfort, the convenience, and the health of the masses have been promoted by this revolution, are too familiar to enlarge upon.

It took many years to impart momentum to this impending revolution. Ten years after Bailey's power machine had been in operation the whole value of stockings, woven shirts, and woven drawers produced in the United States was not over $500,000. The machine itself was still far from a perfect automatic machine, and it had not yet been introduced at all in England. Cognizance of the existence of this industry was not taken by the census until 1850. The rapidity of its development from that date is shown by the following table of the comparative statistics of the industry:

STATISTICS OF HOSIERY AND KNITTING MILLS: 1850–1890.

YEARS.	Number of establishments.	Capital.	Miscellaneous expenses.	Average number of employés.	Total wages.	Cost of materials used.	Value of products
1850	85	$544,735	.....	2,325	$360,336	$415,113	$1,028,102
1860	197	4,035,510	.....	9,103	1,661,972	3,202,317	7,280,606
1870	248	10,931,260	.....	14,738	4,429,085	9,835,823	18,411,564
1880	359	15,579,591	.....	28,885	6,701,475	15,210,951	29,107,227
1890	796	a50,607,738	$3,627,245	61,209	18,263,272	35,861,585	67,241,013

a This amount does not include value of "Hired property".

The number of knitting machines employed in the manufacture, all descriptions being grouped without reference to kind or capacity, increased from 13,038 in 1880 to 36,462 in 1890. There is no earlier record of the number of knitting machines.

The original establishments for the manufacture of knitted fabrics were small, and most of them continued to utilize knitting frames operated by hand. A factory at Portsmouth, New Hampshire, had been started in 1834, which did not introduce power until 1844; and in 1850 that state, now one of the largest producers of this class of goods, turned out a product of 3,000 dozen pairs of hosiery per year, a production considered so enormous that the managers of the single mill in existence doubted if a demand for this supply could be sustained. (*a*)

A new impulse was given to the industry by the adoption of the circular knitting machine invented by Pepper in 1851, and the subsequent introduction of the somewhat similar machine invented by the Messrs. Aiken, father and son.

Improvements on these early machines followed rapidly during the next twenty years, the most important among them being of American origin. The number and variety of patented improvements in machinery specially adapted to this class of industry has exceeded those in any other branch of the textile manufacture. Notable among them was the machine of E. E. Kilbourne, first patented in 1858; the first automatic machine for the making of full fashioned goods, which effected a second revolution in the industry.

But the basis of the present development of the industry was the outbreak of the civil war, during which the government became an enormous purchaser of the heavier and staple classes of hosiery goods, such as woolen shirts, drawers, blouses, and stockings. The great demand from this source, re-enforced by the complete protection which the tariff afforded, and the high prices of gold and exchange, led to the introduction of the manufacture of the finer styles of knitted goods, which had not been previously attempted in this country. Looms and machinery adapted for these goods were brought from abroad, skilled workmen were secured, and the knit-goods industry rapidly expanded to national importance.

Merchantable hosiery and knit goods are of three varieties, as respects the stock used: goods made wholly of wool, those made wholly of cotton, and those made of wool and cotton mixed. The last are known commercially as "merino" goods. The word "merino", meaning originally the fine wool of a Spanish breed of sheep, has come to have this secondary and commercial meaning, for no reason that can be explained, but it is fixed and universally understood. The proportions of goods thus made, as respects material, are determined by the demands of the consumer. The tendency to the larger use of cotton is perceptible. The all-wool underwear, while commended in many quarters on hygienic grounds, contends with the obstacle of high prices, the objection that it shrinks excessively, and that it carries more warmth than is required or desirable during the greater portion of the year. These objections are met by the mixture of cotton with the wool in the spinning of the yarn. From the proportion of half and half, the percentage of cotton employed increases until we reach the all-cotton fabric, of which immense quantities are made, especially of the lighter grades for summer wear. On the basis of this division the product of the country in the census year was divided as follows:

KINDS.	TOTAL.		HALF HOSE.		HOSE.		SHIRTS AND DRAWERS.	
	Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	Dozens.	Value.
Total	.....	$67,241,013	7,078,505	$7,434,131	10,062,886	$11,728,075	6,861,057	$32,961,997
Woolen	4,092,209	16,497,395	1,360,824	2,892,822	2,242,544	4,722,796	1,088,841	8,881,777
Merino or mixed	3,395,362	16,451,999	376,053	604,773	433,083	791,227	2,526,226	15,055,999
Cotton	15,975,477	19,174,809	5,341,628	3,936,536	7,387,259	6,214,052	3,246,590	9,024,221
All other goods	.....	15,116,810	.....	.....	.....	.....	.....	.....

In the production of these goods raw wool, woolen yarn, and worsted yarn, aggregating 32,171,798 pounds and valued at $16,325,020 were used, as against 13,098,714 pounds of the same, valued at $7,433,708, used in 1880. Of cotton and cotton yarns used in their production the quantity was 64,681,466 pounds, valued at $11,301,188, as compared with 28,485,238 pounds of cotton and cotton yarns, valued at $4,547,557, used in 1880.

In addition to the above values cognizance should also be taken of the hosiery and knit goods products composed exclusively of silk, and separately reported under the silk manufacture, to the value of $1,156,172. This is a new development of the industry, which has almost wholly arisen during the past ten years.

The smaller products of the knit goods industry are too numerous for separate classification and enumeration. In addition to hosiery and underwear they comprise a great variety of fancy goods, such as ladies' hoods, shawls, sontags, nubias, scarfs, comforters, basques, afghans, leggings, mits, gloves, and the like, besides jersey cloth, which is simply a fabric knitted instead of woven, of which there were 3,065,057 square yards produced in the census year, valued at $2,157,692.

In the manufacture of these fancy knitted goods, as well as of many qualities of stockings, the line of demarcation between factory and household manufacture often disappears. A number of large houses in the eastern states, who are described as manufacturers, possess no factory and employ no power. They buy yarns in

a Bulletin National Association of Wool Manufacturers, XI, 62.

large quantities, which are given out to women in the surrounding towns to be knitted at home into such special goods as the market requires. This method of manufacturing, as applied to these particular goods, has greatly increased during recent years; and the difficulties attending a complete enumeration of the quantity and the value of products thus manufactured are insurmountable. There are millions of dollars worth of goods so made and sold which have escaped the vigilant search of the census agents. Another large product of knitted goods is enumerated with the glove industry, entering into goods whose chief material is some form of leather. Taken in all its ramifications therefore, and including products which are of semihousehold manufacture, this industry is much larger, in the value of its products, than the statistics indicate.

It is a characteristic of the manufacture of knit goods by machinery that while a vast saving over knit goods by hand is effected, there still remains, for many of its products, a large portion of the work which must be done by hand connected with the finishing of the goods.

SUMMARY AND CONCLUSION.

This investigation has shown that the domestic wool manufacture had reached a point of development, in 1890, where it was fairly on a par in many particulars with the same industry in European countries. Its relative importance may be partially measured by the fact that its consumption of wool now exceeds that of all other nations, with the exception of Great Britain, and that the home production of goods now meets the requirements of the home market, with the exception of about 11 per cent of the total value of the annual consumption of woolen goods, which is supplied by importations derived about equally from Great Britain and from the manufacturing countries of continental Europe. It is believed that this percentage of importations does not materially differ from that which prevails in these foreign countries, but on the other hand it is to be remembered that the United States is the only large wool manufacturing nation which does not manufacture at all for export.

It would not be proper to conclude this report without allusion to certain points of inferiority, both in general method and in the production of limited lines of goods, which are recognized by practical manufacturers who have carefully studied conditions, here and abroad. In England, for instance, organization is better and attention to details is more thorough in consequence. In what may be called the economies of manufacture, the English surpass our own manufacturers as a rule and are probably not surpassed in the world. They have been trained in these economies by their long experience in catering to foreign markets, where they encounter a constantly closer competition. They possess certain definite advantages growing out of the less mobile character of the operative classes. It is common for English workmen in the textile industries to pass their entire lives in the same mill at the same class of work. In the United States the factory population is constantly shifting, not only from mill to mill, but from town to town and into different occupations; and there is increasing difficulty in obtaining and retaining properly trained help. These conditions naturally affect not only the economies of manufacture, but also to a certain extent the quality and character of the products. There are lines of high-grade goods in which the American product does not regularly approach the fineness and perfection of finish peculiar to the goods of foreign mills, which have been exclusively employed on those particular lines for generations. This is especially noticeable in connection with certain products which are the peculiar glory of the French manufacture.

Other conditions have had their bearing in the struggle to overcome this inferiority. Some of these may be described in detail.

I. In England the system of sorting and classifying wools is carried to such perfection that the wool market is amply supplied with all the different sorts, so that the manufacturer may profitably run his mill on the finest or the lowest sort. From the want of concentration of wool in our markets, and other causes, the American manufacturer sorts his own wool, and having it of different grades must make goods of corresponding grades. He must make low as well as high class fabrics; and it has followed that there has been less tendency on the part of the domestic manufacture to confine itself to single specialties, and to base reputation and success upon those specialties.

II. American manufacturers have been handicapped by the comparative lack of expert training in the important departments of designing and dyeing. While the importance of a close and skillful attention to the selection, preparation, and spinning of wool is not easily overestimated, yet it has become more important every year that the highest skill shall be employed in determining the organization of fabrics, both as to pattern and coloring. The wool manufacture has entirely changed in the last sixty years in this respect. Formerly it was employed upon plain textures, of plain colors. The introduction of fancy goods has made it impossible to determine from one season to another what freak or fluctuation in the popular taste will next dominate the market. In this state of facts the designing department becomes the real key to the success of the mill. To study the tendencies of the times, to anticipate them if possible, to capture public favor by novelty of design or pattern, is an art which only long training can impart to great natural aptitude. In the same way the mysteries of the dye house are a study worthy of the highest mind, and the introduction of the aniline dyes has made possible new combinations and shades of coloring, which are constantly appearing.

III. The facilities for technical education in these important departments of manufacture are far superior, in all the manufacturing countries of Europe, to anything existing in the United States. Textile schools exist in Germany, Belgium, Austria, and France, equipped with the most skillful instructors and every appliance, supported wholly or in part by the government, which turn out annually large bodies of carefully trained young men, who take their places in the factories, where they supplement by practical experience the instruction they have received in every department of the manufacture. Of late years similar educational institutions have been established at the chief textile centers of England, also the recipients of public support, and they have rapidly advanced to an efficiency almost equal to that of the continental schools. The influence of these institutions upon the development of the textile industries of the countries in which they are located has been greater than we realize in this country, where we have depended, for the education of experts, upon the schooling of the mills themselves. One school, the Lowell School of Design, connected with the Massachusetts Institute of Technology, has for many years supplied in a limited degree a training somewhat similar to that obtained in these foreign schools. In 1883 a second school, planned to cover instruction in all branches of the textile industry, was

established in Philadelphia, in connection with the Pennsylvania Museum of Fine Arts, through the liberality and public spirit of a few of the leading manufacturers of that city. It has already achieved a notable success, and its graduates are found in the leading mills throughout the country. But its resources are limited, and its capacity still more so, in view of the enormous development of our textile industries during the last quarter of a century. The more successful of our designers and experts in dyeing still come to us from across the water. The United States is far behind Europe in its facilities for the training of men and women in the great work of the application of art to the textile manufacture.

IV. In the mechanical departments, the best American mills do not at present suffer in comparison with those of any other country. It is well known that in the earlier years of the century our manufacturers were terribly handicapped by the inferiority of their machinery. This inferiority they gradually overcame, largely by original inventions, and in other particulars by the importation of foreign-built machinery. The catalogue of American contributions to the mechanical development of wool manufacture is so imposing that the late Dr. Hermann Grothe, the German expert, was led to write that it is not surpassed by that of any other nation, not excepting even England. (*a*) He says there are repeated cases where American finishing machinery has been exported to England and France to become the basis of other improvements, claimed to be original, and essentially contributing to the establishment in those countries of the textile industries. This is prominently the case, he adds, with the machinery for fulling, gigging, and shearing cloth; the fulling mill with rollers is completely an American invention (that of John Dyer, patented in 1833); the invention of the double-crank shaft fulling mill was made by Levi Osborne in 1804, commencing a great series of constructions of the same principle; all the English gigging mills were patented after the gigging mills in America of Christie Olney, Barrows, Beck, Wells, and others, had appeared; the merit of the invention of the cylinder shearing machine belongs to Samuel Griswold Dorr, and of the pressing machine with steam to Seth Hart, who received a patent in 1812. The invention of machinery for the manufacture of felted cloths is exclusively American in its origin. The principle of all the machines for burring wool used here and abroad, viz, striking the burr from a card or toothed cylinder by means of a rapidly revolving guard or blade, was first applied to a machine about 1833 by Michael H. Simpson, of Boston, whose improvements upon the Couillard combing machine were also of a nature so radical as to entitle them to rank as original inventions. Allusion has already been made to the Goulding invention, which dispensed with the billy, and which has been described by Dr. Hayes as "the most important of all contributions to the card-wool industry of the world during the present century". Power was first applied to the knitting machine in the United States in 1832 by Egbert Egberts, at Cohoes, New York, and in the variety, the ingenuity and the importance of the knitting machines for making fashioned knit goods the American contributions are more important than those of all other countries combined. The power carpet loom, in all its varieties, is wholly an American conception. Of looms generally it is recognized that the American inventions and subsidiary appliances are superior in every respect to those of any other country, and they are now made and largely used abroad under concessions from the patentees.

In the subsidiary improvements of machinery for the manufacture of wool. in the scouring machines, the feeding appliances, the automatic stop actions, the thousand smaller mechanisms which increase efficiency and production, which economize labor, and impart regularity and perfection of manufacture, the American contributions have been innumerable, and they have advanced the manufacture, in matters of detail, quite as far, although by less radical steps, as the machines which involved the application of some new principle in mechanism. Many of our mills are in no sense behind the best English mills in the application of these minor mechanisms. While the American visitor in English mills will be struck with some radical points of difference in equipment, he will conclude that in point of general mechanical efficiency the industry occupies practically the same footing in both countries.

The most striking point of difference in mechanical organization lies in the fact that English mills, like those of France and Germany, are as a rule equipped for special classes of work, to the exclusion of all others, while the American mills as generally are equipped for a great variety of processes and of products. The advantages gained by this specialization are too obvious to be dwelt upon at length. A worsted spinning mill, equipped to make a particular number of yarn, will produce that yarn with a greater economy than an American mill, equally perfect in machinery, which is compelled to constantly adjust that machinery to the production of yarns of different numbers. Elsewhere in this report allusion is made to the entirely different system of manufacturing which prevails in England, and to the advantages which spring from it.

V. The United States is the only one of the large wool manufacturing nations which does not have free access to the wool markets of the world. It has developed its wool manufacture along lines very largely determined by this unique position among its competitors, and comparison with other countries is made more difficult on this account. To offset the fact stated, it is true that the United States is the only large wool manufacturing nation which supplies within itself the larger proportion of the raw material consumed in its mills. Of the wool consumed by Great Britain in 1890, 120,000,000 pounds was home grown and 350,000,000 pounds foreign grown. France consumed in the same year 124,000,000 pounds of domestic wool and 295,000,000 pounds of imported wool. The

a Bulletin National Association of Wool Manufacturers, xi: 59.

United States reversed these proportions, consuming 258,681,000 pounds of domestic and 114,116,000 pounds of imported wool, three-quarters at least of the latter being third-class wool consumed in the carpet manufacture. The consequence of this dependence upon a domestic supply has been to very largely persuade the home manufacturer into the production of those classes of goods to which the wools of the United States are best adapted, and for which it is conceded that they have no superiors.

Since the policy of a tariff on wool for the purpose of fostering domestic production was first adopted by the United States the conditions surrounding the wool supply of the world have radically changed. At that time each manufacturing nation relied chiefly upon its home supply of the raw material—England, in particular, depending almost wholly upon her domestic clip, which had been recognized for centuries as one of the chief sources of the national wealth. In 1830 the exported wool clip of the Argentine Republic was barely 60,000,000 pounds; in 1890 it was 258,000,000 pounds, and in previous years it had surpassed 350,000,000 pounds. In 1842 the Australian export of wool was 14,000,000 pounds, that being the first year in which its statistics were recorded; in 1890 the Australian wool clip was 550,000,000 pounds. The Cape of Good Hope clip has increased from 26,000,000 pounds in 1860 to 128,681,000 pounds in 1890. These three countries, which were hardly a factor in the world's wool supply in 1830, are now the sources from which is drawn nearly two-thirds of the clothing and combing wools.

The economic influences of these changes in the sources of the fine wool supply can hardly be traced or estimated, although they are visible everywhere. The United States has been exempt from them, to a very large degree, so far as the manufacture is concerned, not more than 36,000,000 pounds of these wools having reached this country in any one year. But the effect of this constantly increasing new supply of raw material, a supply which at times has seemed to increase faster than the demand, has been very perceptible in the domestic wool markets, where the prices of domestic fleece have sympathized closely with the fluctuations in prices abroad. The average annual price of the average Port Philip fleece has fallen in the London market from 25 pence in 1873 to 16 pence in 1890, and of Buenos Ayres average greasy from 7 to 5 pence between the same years, while the decline in Ohio medium fleece was from 68 cents in 1873 to 37 cents in 1890. In view of the steady forcing down of the price of domestic wool, notwithstanding the tariff, by the pressure of increased production, on a large scale, in these countries of the southern hemisphere, where the conditions attending sheep raising are in some respects superior to those of our own country, it may be taken for granted that there will never be any considerable exportation of domestic wool.

On the other hand, it is not to be expected that there will ever be any considerable domestic supply of the coarse long wools chiefly relied upon by our great carpet industry. The sheep producing these wools are comparatively worthless for mutton, their fleece is light in weight, and because of its coarseness brings a comparatively low price in the market. The culture of such sheep is not likely to be pursued as a final object where any purpose is entertained of improved sheep husbandry, and in those sections of the United States where the native sheep of Mexican origin have predominated the breeding up has been rapid. We have produced admirable carpet wools in Colorado and the territories, equal in whiteness, strength, and length of staple to the best imported from South America. But the supply of domestic carpet wools now reaching the markets is merely nominal, and it is a fact well recognized by intelligent growers that carpet wools can not be grown with profit in this country, and therefore that practically they can not be grown at all.

In the production of the finer wools the domestic supply, instead of increasing in consonance with the increased requirements of the American manufacturers, is growing less from year to year. In Pennsylvania, Ohio, Michigan, and other states which are peculiarly adapted to the growth of fine wools, and from which the domestic supply has come, the number of sheep has been steadily declining for many years. While improvements in machinery have permitted a larger and larger use of the increasing supplies of territorial wools for purposes akin to those of the fine wools, yet there exists a deficiency, which is made up by increasing importations of Australasian wools. It is frequently asserted that the United States possesses every variety of soil and climate and all the food conditions necessary to produce every grade of wool in quantities equal to the utmost domestic demand. Regarding this proposition, it is enough to say that if the conditions exist the supply does not, and that the deficiency must therefore be made up from foreign sources. The increase in our importations of Australian wools has been the most marked characteristic of the industry during the decade ending with 1890. The records of the Treasury Department do not contain the complete details of Australian wool imported in 1879 and 1880. The direct importations were 399,518 pounds in 1879 and 7,666,604 pounds in 1880, additional supplies coming in both years from the London auction sales. In 1890 the importations direct and via London reached a total of 11,950,158 pounds, and in several prior years were even more, reaching 16,577,974 pounds in 1886. While these importations are insignificant in amount when compared with the domestic wool clip, they are very large in comparison with the domestic clip of strictly fine wool of a like grade. In making their purchases of Australian wool the American manufacturers and dealers are confined to the wools of lightest shrinkage, upon which the duty operates the least severely, and as the supply of light-shrinkage wools is limited, the American competition influences to increase their price over that of other wools of like quality but heavy shrinkage, thus further limiting their purchases as compared with what they would be under an ad valorem form of duty.

VI. Another disadvantage under which the domestic wool manufacture labors, is the fact that it is, and always has been, subject to conditions by which styles and fashions are determined abroad. London sets the fashions in men's wear goods, and Paris in women's wear goods. The American manufacturer, except the maker of plain and staple fabrics, is compelled to follow the styles determined in these cities, if he expects to command the home trade. This is always a difficult and sometimes an impossible thing to do, under the existing system which compels the manufacture of goods fully a year in advance of the season for whose wear they are intended. The difficulty is greatly increased by the survival of the prejudice born in the primitive days of the manufacture, in favor of foreign as against home-made woolens. This prejudice is disappearing, but it is still a positive factor which must be recognized. Mr. H. N. Slater, of Webster, Massachusetts, in a letter written in 1888, stated the degree of this prejudice and the common method of meeting it, as follows:

> Our family has been engaged in the broadcloth manufacture in this town since 1818, during which time more or less fine Saxony wool has been required and imported for us. * * * These superfine cloths have never been sold directly to the merchant tailor as American, and could not now be if manufactured. The impression is general among the trade that they can not be made in this country, the average consumer wanting something "foreign". During many years (forty years ago) our goods were made, tilloted, and sold (but not as a rule directly) as foreign goods. No merchant tailor thinks of offering a fashionable gentleman a fine American cloth.

The habit of affixing foreign labels to home-made goods is still a common one, and is a device warranted by a prejudice which is no longer justifiable on any ground, and is in strange contrast with the intense Americanism of our people in other respects.

In the facts last stated may be found one of the chief reasons why the quantities and values of woolen goods imported into the United States have exceeded those in any other manufacturing industry, with the single exception of iron and steel, almost from the beginning of the century. In its ratio to the value of the domestic product, the value of woolen goods imported has largely exceeded that of the imports of iron and steel. What this ratio for woolen goods has been at each of the census periods from 1820 is shown in the following table, which also gives the value per capita at each of the census periods, both of the domestic products and the importations, and the percentage of each in the total consumption of the year:

COMPARATIVE STATEMENT OF DOMESTIC AND IMPORTED WOOL MANUFACTURES, WITH PER CAPITA VALUE AND PERCENTAGE OF TOTAL CONSUMPTION. (*a*)

DOMESTIC MANUFACTURES (CENSUS).		Value per capita.	Per cent of total consumption.	NET IMPORTATIONS (AVERAGE FOR 10 YEARS).	Value per capita.	Per cent of total consumption.
Years.	Value.			Value.		
1820	$4,413,068	$0.46	30.15	*b*$6,859,702	$0.71	60.85
1830	14,528,166	1.13	63.67	8,290,062	0.64	36.33
1840	20,696,909	1.21	59.74	13,950,772	0.82	40.26
1850	49,636,881	2.14	79.24	13,005,852	0.56	20.76
1860	80,734,606	2.57	72.04	31,333,273	1.00	27.96
1870	217,608,826	5.65	86.82	33,046,521	0.86	13.18
1880	267,252,913	5.33	87.11	39,537,694	0.79	12.89
1890	337,768,524	5.39	88.63	43,345,981	0.69	11.37

a Cotton hosiery and knit goods, included in the census figures of this table, are not included in the value of imports.
b Net imports for year ending September 30, 1821.

The value per capita of the domestic manufactures in 1870 is a currency value, at a time when the gold value of the dollar averaged 79.81 cents. Allowance being made for that fact, the per capita valuation of the product has shown a nearly uniform increase in each decade since 1860, and was in 1890 just 2.10 times the value per capita in 1860. In other words, the increase in the industry has been in more than double the ratio of the increase in the population. The decrease in the per capita value of the imports of woolen goods has not been in the same ratio, showing that the consuming capacity of the American people has kept steadily in advance of the increasing productive capacity of the wool manufacturers. The percentage of foreign goods in the total annual consumption of our people is now no larger than it is in Great Britain.

In considering the following tables, presenting the data for all branches or subdivisions of the wool industry, reference should be made to the text and tables on the combined textile industries which precede this report.

Tables 1 and 2. To enable a convenient comparison of the statistics relating to the wool manufacture at different census periods, Table 1 comprises all the items of the inquiry common to a number of such periods, and the statistics are given for each decennial year from 1840 to 1890, both inclusive; this is followed by a similar statement (Table 2) for the manufacture of hosiery and knit goods. Particular attention is invited to the fact that these comparative tables include the results of widely varying methods of inquiry, so that a careful consideration of the explanatory footnotes is essential in order to avoid erroneous deductions.

Table 3 contains the totals by states for the principal items of the inquiry for 1890, considering the industry as a whole and including the manufacture of hosiery and knit goods.

Table 4 exhibits a total for the United States, under each item of the schedule of inquiry for 1890 (excepting details relating to employés and their wages), for each branch of the industry, viz, woolen mills, worsted mills, carpet mills (other than rag), felt mills, wool hat mills, and hosiery and knitting mills. The general heads under which the itemized statistics will be found are as follows: Capital, miscellaneous expenses, power, machinery, materials, and products.

The six tables following Table 4 correspond thereto in form and scope, but contain statistics for each of the different branches of the industry which are segregated in these tables and shown by totals for each state and for the United States. Their titles are as follows:

Table 5. Woolen mills.
Table 6. Worsted mills
Table 7. Carpet mills.
Table 8. Felt mills.
Table 9. Wool hat mills.
Table 10. Hosiery and knitting mills.

Table 11 is a presentation of employés and wages for the wool industry considered in its entirety. It shows, by totals for each state and for the United States the average number of men, women, and children distributed into the following classes: (1) Officers or firm members actively engaged in the industry or in supervision; (2) clerks; (3) operatives and skilled labor; (4) unskilled labor; (5) pieceworkers.

The average number of weeks employed, the average weekly earnings per employé, and the total wages are shown for men, women, and children in each class, excepting pieceworkers. The statement for pieceworkers gives the total number of men, women, and children, respectively, and the total wages reported for each.

Table 12 presents the employés and wages for each of the six branches or subdivisions of the wool industry in the same form as Table 11, showing totals for each state and for the United States.

Table 13 shows for the wool manufacture in its entirety the various weekly rates of wages paid, and the average number of men, women, and children employed at each rate, by totals for each state and for the United States.

In Table 14 the data contained in Table 13 are segregated and shown for each branch of the industry, by totals for each state and for the United States.

Table 15 contains the data relating to custom carding mills, which have been included as woolen mills in the preceding tables; they are segregated in this table, and a distinct presentation is made by totals for states and for the United States.

Table 16 shows details, by totals for states and for the United States, relating to the number of establishments idle during the census year, their capital and machinery.

Table 17 contains a detailed presentation by totals for states and for the United States, showing the results of the inquiry relating to the shoddy manufacture.

TABLE I.—COMPARATIVE STATEMENT OF WOOL MANUFACTURE FOR THE UNITED

(EXCLUDING HOSIERY

	STATES AND TERRITORIES.	Number of establishments. (b)	Capital. (c)	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.					MACHINERY.	
				Aggregates.		Males above 16 years.	Females above 15 years.	Children.	Cards.	Combing machines.
				Average number.	Total wages.					
	United States:									
1	1840	1,420	$15,705,124	21,342	.....	21,342	.....	.....	.....	.....
2	1850 (d)	1,675	31,971,631	45,438	.....	26,559	18,879	.....	.....	.....
3	1860 (e)	1,476	38,814,422	50,419	$11,699,630	29,852	20,567	.....	3,319	.....
4	1870	2,308	121,451,059	105,071	35,928,150	53,400	39,150	12,521	8,705	261
5	1880	2,330	143,512,278	132,672	40,687,612	67,942	49,107	15,623	6,989	515
6	1890	1,693	e245,886,743	157,923	58,397,470	82,080	65,066	10,777	7,015	869
	New England states:									
7	1840	489	9,259,935	11,268	.....	11,268	.....	.....	.....	.....
8	1850	482	17,667,892	22,520	.....	11,980	10,540	.....	.....	.....
9	1860	420	24,700,353	30,130	7,032,555	16,993	13,137	.....	1,774	.....
10	1870	675	63,856,145	54,851	19,588,984	26,462	22,605	5,784	3,471	225
11	1880	564	75,522,666	67,582	21,390,036	34,939	25,712	6,931	3,390	302
12	1890	518	134,627,725	79,063	30,027,697	43,599	31,178	4,286	3,762	519
	Maine:									
13	1840	24	316,105	532	.....	532	.....	.....	.....	.....
14	1850	36	467,600	624	.....	310	314	.....	.....	.....
15	1860	28	940,400	1,064	273,596	565	499	.....	80	.....
16	1870	108	4,187,745	3,104	1,005,151	1,592	1,287	225	335	.....
17	1880	96	4,016,328	3,244	1,090,528	1,810	1,140	294	274	.....
18	1890	78	9,456,830	5,193	1,961,511	3,285	1,758	150	387	5
	New Hampshire:									
19	1840	66	740,345	893	.....	893	.....	.....	.....	.....
20	1850	61	2,437,700	2,127	.....	926	1,201	.....	.....	.....
21	1860	54	2,647,300	2,655	687,746	1,291	1,364	.....	204	.....
22	1870	82	5,626,100	5,081	1,788,894	2,259	2,328	494	360	12
23	1880	61	7,150,855	5,599	1,701,619	2,811	2,284	504	317	21
24	1890	52	12,015,721	6,222	2,352,565	3,276	2,762	184	380	29
	Vermont:									
25	1840	95	1,406,950	1,450	.....	1,450	.....	.....	.....	.....
26	1850	72	886,300	1,303	.....	683	710	.....	.....	.....
27	1860	46	1,746,300	2,073	214,572	895	1,178	.....	99	.....
28	1870	66	2,330,900	1,805	649,628	935	759	201	177	.....
29	1880	44	2,320,161	2,084	544,138	1,171	783	130	145	.....
30	1890	29	3,304,382	1,585	625,440	947	601	37	120	.....
	Massachusetts:									
31	1840	144	4,170,850	5,076	.....	5,076	.....	.....	.....	.....
32	1850	119	9,089,342	11,130	.....	6,167	4,963	.....	.....	.....
33	1860	147	13,005,853	15,638	3,058,589	8,964	6,674	.....	873	.....
34	1870	226	26,722,900	28,025	9,809,718	13,228	11,961	2,836	1,433	172
35	1880	214	36,764,000	34,717	11,027,822	17,588	14,060	3,069	1,022	190
36	1890	219	60,508,586	38,363	14,658,774	21,231	15,420	1,712	1,785	265
	Rhode Island:									
37	1840	41	685,350	961	.....	961	.....	.....	.....	.....
38	1850	45	1,013,000	1,758	.....	987	771	.....	.....	.....
39	1860	58	3,109,000	4,232	1,069,728	2,594	1,638	.....	253	.....
40	1870	76	10,467,500	7,894	2,862,492	3,644	3,184	1,066	484	7
41	1880	61	13,016,116	12,125	3,703,257	5,871	4,387	1,867	495	70
42	1890	69	24,310,743	17,787	6,561,759	8,946	7,114	1,727	558	193
	Connecticut:									
43	1840	119	1,931,335	2,356	.....	2,356	.....	.....	.....	.....
44	1850	149	3,773,950	5,488	.....	2,907	2,581	.....	.....	.....
45	1860	87	3,191,500	4,468	1,128,324	2,684	1,784	.....	265	.....
46	1870	117	14,521,000	8,852	3,413,101	4,804	3,086	962	682	34
47	1880	88	12,255,206	9,813	3,322,072	5,688	3,058	1,067	543	21
48	1890	71	18,971,463	9,913	3,867,048	5,914	3,523	476	532	27
	Middle states:									
49	1840	620	5,519,175	8,464	.....	8,464	.....	.....	.....	.....
50	1850	717	8,351,908	13,802	.....	8,549	5,253	.....	.....	.....
51	1860	659	10,472,728	16,121	3,717,095	9,928	6,193	.....	920	.....
52	1870	1,024	37,194,990	36,322	12,619,089	18,182	13,028	5,112	2,558	36
53	1880	794	53,834,368	54,138	16,682,073	26,797	20,144	7,197	2,154	210
54	1890	652	86,140,259	63,757	23,929,322	30,938	27,472	5,347	2,203	301
	New York:									
55	1840	323	3,469,349	4,636	.....	4,636	.....	.....	.....	.....
56	1850	249	4,459,370	6,674	.....	4,262	2,412	.....	.....	.....
57	1860	168	4,133,568	6,123	1,351,955	3,475	2,648	.....	324	.....
58	1870	272	14,451,232	12,487	4,315,710	6,199	4,583	1,705	940	1
59	1880	189	18,248,698	16,428	5,189,180	7,405	6,931	2,092	830	80
60	1890	138	26,853,583	17,693	6,596,593	8,167	8,217	1,309	702	84
	New Jersey:									
61	1840	31	314,650	427	.....	427	.....	.....	.....	.....
62	1850	41	494,274	898	.....	411	487	.....	.....	.....
63	1860	45	646,200	986	226,788	608	378	.....	61	.....
64	1870	36	1,524,200	1,522	493,054	709	552	261	98	6
65	1880	37	2,991,125	4,072	1,152,754	2,287	1,118	667	161	9
66	1890	35	6,441,571	5,971	2,073,771	2,905	2,787	219	202	29

a The comparative statement of hosiery and knit goods manufacture is given on pages 80 to 85.

b The number of establishments affords no clew to the growth or condition of the industry of wool manufacturing. This is due to the fact that in all censuses of the industry (except that of 1860) the custom carding mill has been counted as a wool factory, although it is not, in the modern use of the term, a factory, and ought not therefore to be included with the statistics of factory manufacture. The present census has made such an elimination possible hereafter by a distinct statement (Table 15) of the statistics of custom carding mills.

STATES, BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1840–1890.

AND KNIT GOODS.) (a)

MACHINERY—cont'd.		Cost of materials used.	PRINCIPAL RAW MATERIALS—QUANTITIES CONSUMED.						Value of products.	
			Wool.			Hair, noils, etc. (Pounds.)	Cotton. (Pounds.)	Shoddy. (Pounds.)		
Looms.	Spindles.		Total. (Pounds.)	Foreign. (Pounds.)	Domestic. (Pounds.)					
									$20,696,999	1
		$28,831,583	70,862,829						48,008,779	2
16,075	639,700	43,447,048	95,452,159				17,248,061		73,454,000	3
45,737	2,046,113	124,318,792	214,373,219	46,288,805	168,084,414		26,420,626	19,384,404	199,257,262	4
57,297	2,111,973	149,160,600	287,597,334	72,751,940	214,845,394	8,011,037	63,330,664	50,640,663	238,085,686	5
60,658	2,793,147	167,233,987	351,158,020	111,382,308	239,775,712	26,262,316	94,372,267	56,826,475	270,527,511	6
									12,959,486	7
		16,055,233	43,118,059						26,077,812	8
8,920	393,333	29,570,028	67,702,407				11,883,078		47,722,814	9
21,865	1,206,717	68,819,733	123,791,815	30,295,579	93,496,236		11,479,564	10,917,494	108,295,425	10
30,692	1,246,100	80,152,160	163,763,773	43,475,554	120,288,219	2,441,485	26,775,273	28,653,694	130,014,752	11
33,348	1,570,097	86,887,089	195,867,736	58,429,807	137,437,929	9,366,220	30,833,876	35,721,895	139,302,134	12
									412,366	13
		495,940	1,438,434						753,300	14
185	11,705	1,035,876	2,454,300				82,500		1,759,007	15
1,161	66,649	4,013,759	7,721,228	382,727	7,338,501		769,363		6,483,881	16
1,103	68,192	4,443,190	9,074,011	1,085,606	7,988,405	402,707	1,576,462	1,302,789	6,959,009	17
2,020	126,418	5,075,347	13,782,749	1,744,381	12,038,368	1,346,818	2,639,802	1,515,035	8,737,653	18
									705,784	19
		1,267,329	3,604,103						2,127,745	20
606	36,320	2,775,020	5,505,106				861,000		4,358,713	21
1,605	125,079	6,569,028	11,832,666	1,968,869	9,863,797		1,670,994	1,380,000	10,513,226	22
2,884	138,223	6,605,355	15,172,837	2,379,575	12,793,262	50,362	2,871,944	3,115,890	10,858,071	23
4,049	136,648	7,024,461	18,696,016	4,854,212	13,841,804	150,056	4,308,465	3,424,970	10,963,250	24
									1,331,953	25
		830,084	2,328,100						1,579,161	26
463	23,371	1,662,650	4,047,010				279,500		2,938,626	27
670	49,255	1,955,972	4,611,347	1,120,680	3,490,667		77,800	225,967	3,644,459	28
746	46,264	2,012,490	3,603,191	161,404	3,441,787	7,598	640,470	2,286,150	3,217,807	29
682	41,839	1,435,103	3,940,070	1,279,250	2,660,820	8,650	659,601	1,562,221	2,723,683	30
									7,082,898	31
		8,671,671	22,220,952						12,770,505	32
4,237	159,651	15,307,378	39,731,072				5,871,370		24,015,443	33
11,662	567,611	33,795,994	63,499,752	20,189,746	43,310,006		5,056,357	5,994,110	52,270,608	34
15,863	588,941	40,283,171	84,929,798	28,011,595	56,918,203	1,751,208	13,704,566	13,017,085	61,968,209	35
16,349	739,952	42,273,379	97,757,379	34,930,030	62,827,349	6,770,990	15,160,584	21,608,371	67,599,321	36
									842,172	37
		1,463,900	4,103,370						2,381,825	38
1,586	86,048	4,071,464	6,835,100				3,050,200		6,917,705	39
3,383	215,973	9,826,158	14,421,967	772,247	13,649,720		1,697,139	919,009	15,394,067	40
6,957	228,262	13,079,812	27,141,974	4,469,088	22,672,886	166,893	4,783,289	2,027,782	21,588,204	41
6,608	340,326	19,976,086	30,973,992	8,929,242	31,044,750	317,184	4,095,989	2,168,503	32,205,829	42
									2,494,313	43
		3,325,709	9,414,100						6,465,216	44
1,753	76,178	4,657,634	9,129,819				1,732,508		7,733,320	45
3,294	182,150	12,658,822	21,704,855	5,861,310	15,843,545		2,207,911	2,398,417	19,989,184	46
3,139	176,218	13,728,142	23,841,902	7,368,286	16,473,676	62,717	3,198,542	6,903,998	22,423,458	47
3,640	184,914	10,503,253	21,717,530	6,692,692	15,024,838	772,522	3,969,375	5,442,795	17,072,398	48
									6,637,708	49
		8,040,747	22,437,754						14,065,456	50
6,432	210,054	10,938,446	18,910,319				4,943,183		20,386,330	51
18,201	554,247	41,941,018	61,166,252	15,834,201	45,332,051		13,321,576	8,457,123	68,467,540	52
22,206	638,484	57,908,066	95,389,023	28,976,386	66,412,637	5,463,552	33,857,475	20,961,183	91,136,451	53
29,002	914,990	68,103,765	118,634,796	50,706,698	67,928,098	16,823,593	54,972,659	18,913,964	110,011,526	54
									3,537,337	55
		3,838,292	12,538,786						7,030,604	56
1,686	87,887	4,311,116	8,535,498				193,683		7,498,077	57
3,860	166,260	11,676,379	25,518,652	9,305,770	16,212,873		1,186,059	452,990	19,609,021	58
3,870	198,420	14,478,735	29,987,847	13,495,159	16,492,688	1,894,947	4,434,013	2,166,471	25,078,747	59
5,025	344,847	16,759,138	35,305,969	21,345,999	13,959,970	2,074,631	7,781,739	1,617,481	28,563,569	60
									440,710	61
		548,367	1,510,289						1,104,446	62
270	10,361	596,895	1,443,800				239,500		1,197,694	63
776	26,769	1,618,753	2,856,525	480,347	2,376,178		407,398	27,000	2,616,461	64
1,285	35,791	3,858,992	6,990,378	655,001	6,335,377	1,107,749	1,559,502	2,676,856	5,967,893	65
1,533	77,069	5,450,490	12,524,210	1,348,047	11,176,163	490,110	2,625,882	2,927,640	8,893,237	66

c Value of hired property is not included in the capital reported in 1890, because it was not included in the reports of previous census years.

d The details of the carpet industry were not given by states in 1850. The totals, however, have been added to the "Total for the United States" in this table, the figures being as follows: establishments, 116; capital, $3,852,981; number of employés, 6,186; cost of materials used, $3,075,592, and value of products, $5,401,234.

e Carding mills were not included in the report of the woolen industry of 1860, and are therefore not included in the figures for that year in the above table. There were 712 of these establishments, with a total capital of $1,080,985, employing 1,276 hands, at a cost of $286,267. They received 5,230,651 pounds of wool and produced 5,091,196 pounds of wool rolls, valued at $2,403,513.

TABLE 1.—COMPARATIVE STATEMENT OF WOOL MANUFACTURE FOR THE UNITED STATES, (EXCLUDING HOSIERY

	STATES AND TERRITORIES.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.					MACHINERY.	
				Aggregates.		Males above 16 years.	Females above 15 years.	Children.	Cards.	Combing machines.
				Average number.	Total wages.					
1	Pennsylvania:									
2	1840	235	$1,510,546	2,030		2,030				
3	1850	380	3,005,064	5,726		3,490	2,236			
4	1860	407	5,211,510	8,484	$2,016,384	5,488	2,996		483	
5	1870	672	20,615,413	21,573	7,607,489	10,831	7,714	3,028	1,429	29
6	1880	548	31,898,226	32,989	10,162,244	16,688	11,936	4,365	1,120	121
	1890	467	52,021,256	39,413	15,031,632	19,463	16,238	3,712	1,254	188
7	Delaware:									
8	1840	2	107,000	83		83				
9	1850	8	148,500	140		122	18			
10	1860	4	117,000	114	27,564	76	38		8	
11	1870	11	384,500	399	115,137	186	110	103	30	
12	1880	5	352,559	261	108,504	171	59	31	13	
	1890	3	450,974	297	103,395	146	112	39	15	
13	Maryland: (a)									
14	1840	29	117,630	388		388				
15	1850	38	244,000	362		262	100			
16	1860	35	364,450	414	94,404	281	133		44	
17	1870	32	215,245	339	87,099	255	69	15	61	
18	1880	15	343,760	388	69,391	246	100	42	30	
	1890	9	372,875	383	123,931	197	118	68	30	
19	District of Columbia: (a)									
20	1840									
21	1850	1	700	2		2				
22	1860									
23	1870	1	4,400	2	600	2				
24	1880									
	1890									
	Southern states:									
25	1840	115	304,650	488		488				
26	1850	155	747,360	1,119		808	311			
27	1860	116	1,744,100	2,205	418,368	1,420	776		232	
28	1870	589	3,327,952	2,888	575,529	1,831	669	388	908	
29	1880	447	2,994,517	2,645	493,634	1,498	745	402	540	
30	1890 (b)	222	7,894,776	5,717	1,564,840	2,620	2,429	668	385	4
31	Virginia:									
32	1840	41	112,350	222		222				
33	1850	121	392,640	668		478	190			
34	1860	45	463,600	494	106,092	381	113		50	
35	1870	68	435,375	278	58,705	190	56	32	116	
36	1880	48	456,750	365	71,720	251	95	19	54	
	1890	35	845,221	444	117,023	293	120	31	54	
37	North Carolina:									
38	1840	3	9,800	4		4				
39	1850	1	18,000	30		15	15			
40	1860	7	223,000	253	60,036	113	140		23	
41	1870	52	237,800	240	39,101	151	81	17	78	
42	1880	49	203,100	185	23,195	120	50	15	57	
	1890	27	339,088	324	65,329	170	125	29	35	
43	South Carolina:									
44	1840	3	4,300	6		6				
45	1850									
46	1860	1	50,000	92	11,400	37	55		10	
47	1870	15	25,900	53	3,815	32	13	8	25	
48	1880	11	7,900	13	1,173	13			11	
	1890 (b)									
49	Georgia:									
50	1840	1	2,000	10		10				
51	1850	3	68,000	78		40	38			
52	1860	11	242,500	383	63,348	107	216		80	
53	1870	46	936,585	563	122,138	251	191	121	72	
54	1880	32	180,733	142	25,070	72	45	25	42	
	1890	14	298,539	170	32,401	81	71	27	20	
55	Alabama:									
56	1840									
57	1850									
58	1860	6	140,000	198	34,116	95	103		14	
59	1870	14	22,375	41	4,881	38	1	2	24	
60	1880	14	28,900	18	3,037	13	5		15	
	1890	6	18,325	16	3,125	11	5		6	
61	Texas:									
62	1840									
63	1850	1	8,000	8		4	4			
64	1860	2	60,000	43	7,680	36	7		4	
65	1870	20	97,250	100	20,278	80	16	4	20	
66	1880	1	97,500	36	25,700	28	8		2	
	1890	4	371,270	359	138,795	142	176	41	9	
67	Mississippi:									
68	1840									
69	1850									
70	1860	4	75,500	235	22,620	202	33		13	
71	1870	11	195,250	116	28,800	34	31	51	17	
72	1880	8	331,500	218	53,100	111	61	46	15	
	1890	7	1,553,455	1,082	306,270	415	443	224	31	

a Maryland and the District of Columbia are classed in this table as middle states for purposes of comparison.

BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1840–1890—Continued.

AND KNIT GOODS.)

MACHINERY—cont'd.		Cost of materials used.	PRINCIPAL RAW MATERIALS—QUANTITIES CONSUMED.						Value of products.	
			Wool.			Hair, noils, etc. (Pounds.)	Cotton. (Pounds.)	Shoddy. (Pounds.)		
Looms.	Spindles.		Total (Pounds.)	Foreign. (Pounds.)	Domestic. (Pounds.)					
									$2,319,061	1
		$3,282,718	7,560,379						5,321,860	2
4,334	108,326	5,674,197	7,703,249				4,337,000		10,901,767	3
13,265	340,114	28,010,301	31,723,147	6,014,170	25,708,977		11,504,634	7,879,203	45,221,795	4
16,789	393,387	38,740,330	56,751,365	14,623,020	42,128,345	2,940,522	27,771,271	15,463,876	58,886,250	5
22,101	474,618	45,173,677	69,387,219	27,877,283	41,509,936	14,258,852	44,218,488	14,232,953	72,393,182	6
									104,700	7
		204,172	393,000						251,000	8
		75,807	140,000				100,000		153,035	9
76	1,000	392,614	546,187	12,455	533,732		185,000	96,930	576,667	10
227	8,756	448,285	836,883	203,206	633,677	20,084	55,100	346,778	665,253	11
126	4,306	295,605	531,198	35,369	495,829		314,500	95,890	482,022	12
									235,900	13
		165,568	430,300						205,140	14
66	2,480	280,431	1,087,772				73,000		635,757	15
160	12,348	241,224	521,741	21,450	500,291		37,885	1,000	441,596	16
136	6,580	381,724	822,550		822,550	250	37,589	207,200	538,308	17
114	11,150	424,855	886,200	100,000	786,200		32,050	40,000	570,516	18
										19
		1,630	5,000						2,400	20
										21
3		1,747							2,600	22
										23
										24
									321,357	25
		750,203	2,448,026						1,293,642	26
296	16,544	1,634,730	5,042,682				421,800		2,840,550	27
1,322	50,311	2,715,827	5,912,589	1,200	5,911,389		616,459	2,762	4,278,311	28
1,315	47,980	2,736,023	6,021,980	85,000	5,936,980	500	1,455,408	270,647	3,058,571	29
3,788	106,541	4,000,966	8,730,576	357,790	8,372,786	61,741	5,395,513	1,188,847	6,700,545	30
									147,792	31
		488,890	1,554,110						841,013	32
121	7,574	389,204	1,131,000				10,000		717,827	33
137	6,236	317,800	742,200	1,200	741,000		27,200		488,352	34
154	8,486	383,080	862,812	5,000	857,812	500	104,170	60,500	577,968	35
212	12,382	375,175	975,745	25,367	950,378	1,500	105,112	88,585	609,809	36
									3,900	37
		13,950	30,000						23,750	38
20	1,000	151,005	504,500						291,000	39
97	2,806	166,497	355,693		355,693		10,000		298,638	40
30	2,374	255,707	576,145	80,000	496,145		118,464	12,444	363,100	41
169	10,900	198,358	449,260	50,760	398,500	40,374	282,860	40,000	308,946	42
									1,000	43
										44
		60,000	250,000						80,000	45
9	350	22,238	55,696		55,696		1,300	700	34,459	46
		19,455	48,950		48,950				24,075	47
										48
									3,000	49
		30,392	153,816						88,750	50
20	1,480	260,475	1,008,600				142,500		464,420	51
395	14,465	268,176	620,937		620,937		165,000		471,523	52
88	2,224	165,065	366,274		366,274		134,418		239,300	53
119	3,552	95,999	208,992	32,000	176,992	19,807	87,815	10,000	173,245	54
										55
										56
20	1,000	80,790	264,435				5,000		101,474	57
2	530	57,338	196,500		196,500		2,000		89,998	58
10	160	49,361	135,366		135,366		10,000		63,745	59
12	288	10,997	10,569		10,569		7,500	20,000	17,150	60
										61
		10,000	30,000						15,000	62
		25,980	81,900				18,000		38,796	63
30	1,070	86,817	278,045		278,045				152,908	64
12	600	44,435	175,000		175,000				80,500	65
135	1,900	186,607	572,400		572,400		103,000	1,000	359,230	66
										67
										68
21	1,000	119,849	270,597				75,600		158,507	69
30	344	79,566	154,790		154,790		32,700		147,323	70
121	3,734	211,646	494,033		494,033		205,896		299,605	71
376	9,196	508,039	1,565,824		1,565,824		416,000	36,000	924,185	72

b Includes reports from 2 establishments located (1) in Florida and (1) South Carolina. These establishments are not shown separately, in order that the operations of individual establishments may not be disclosed.

TABLE 1.—COMPARATIVE STATEMENT OF WOOL MANUFACTURE FOR THE UNITED STATES,

(EXCLUDING HOSIERY

	STATES AND TERRITORIES.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.					MACHINERY.	
				Aggregates.		Males above 16 years.	Females above 15 years.	Children.	Cards.	Combing machines.
				Average number.	Total wages.					
	Arkansas:									
1	1840	1	$12,000	1	.....	1	.....	.....	.....	.....
2	1850	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	1860	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	1870	13	32,500	31	$6,870	29	.....	2	17	.....
5	1880	25	85,550	90	13,226	62	21	7	29	.....
6	1890	6	27,435	31	6,231	16	12	3	7	.....
	Tennessee:									
7	1840	26	25,600	45	.....	45	.....	.....	.....	.....
8	1850	4	10,900	17	.....	15	2	.....	.....	.....
9	1860	1	6,000	10	2,472	8	2	.....	1	.....
10	1870	148	373,868	428	62,780	342	61	25	177	.....
11	1880	106	418,664	402	67,065	249	111	42	98	.....
12	1890	49	1,393,679	998	239,057	428	446	124	80	.....
	Florida:									
13	1840	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	1850	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	1860	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	1870	1	500	1	.....	1	.....	.....	1	.....
17	1880	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	1890 (a)	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Louisiana:									
19	1840	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	1850	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	1860	1	75,000	60	6,720	40	20	.....	4	.....
22	1870	2	34,000	29	8,900	22	3	4	12	.....
23	1880	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	1890	.....	.....	.....	.....	.....	.....	.....	.....	.....
	West Virginia:									
25	1840	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1850	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1860	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	1870	74	236,100	316	59,828	207	79	30	132	.....
29	1880	55	293,170	353	44,161	226	96	31	72	.....
30	1890	30	336,281	287	61,919	171	105	11	41	.....
	Kentucky:									
31	1840	40	138,000	200	.....	200	.....	.....	.....	.....
32	1850	25	249,820	318	.....	256	62	.....	.....	.....
33	1860	37	408,500	437	103,284	350	87	.....	83	.....
34	1870	125	700,449	683	159,373	454	137	92	208	.....
35	1880	98	890,750	823	166,189	353	253	217	154	.....
36	1890	42	2,705,683	1,994	593,305	890	926	178	100	4
	Western states:									
37	1840	196	681,364	1,122	.....	1,122	.....	.....	.....	.....
38	1850	205	1,351,490	1,811	.....	1,341	470	.....	.....	.....
39	1860	280	1,727,241	1,873	481,812	1,435	438	.....	383	.....
40	1870	906	14,897,772	10,172	2,802,135	6,212	2,809	1,151	1,701	.....
41	1880	505	8,877,427	7,227	1,697,463	3,816	2,357	1,054	807	3
42	1890	287	13,254,918	7,720	2,412,634	3,756	3,535	429	574	15
	Ohio:									
43	1840	130	537,985	935	.....	935	.....	.....	.....	.....
44	1850	130	870,220	1,201	.....	903	298	.....	.....	.....
45	1860	122	602,000	753	185,268	567	186	.....	173	.....
46	1870	225	3,066,969	2,320	574,164	1,351	710	268	334	.....
47	1880	123	1,389,340	1,432	279,614	773	445	214	182	2
48	1890	69	2,479,872	1,431	449,026	686	591	154	104	5
	Indiana:									
49	1840	37	77,954	103	.....	103	.....	.....	.....	.....
50	1850	33	171,545	246	.....	189	57	.....	.....	.....
51	1860	79	464,341	533	150,276	436	97	.....	112	.....
52	1870	175	3,821,013	2,469	726,113	1,450	711	308	346	.....
53	1880	81	2,273,705	1,741	462,681	846	587	308	160	1
54	1890	46	2,969,356	2,147	609,808	911	1,124	112	135	4
	Illinois:									
55	1840	16	26,205	34	.....	34	.....	.....	.....	.....
56	1850	16	154,500	178	.....	124	54	.....	.....	.....
57	1860	25	210,100	166	45,180	132	34	.....	37	.....
58	1870	109	2,902,443	1,736	535,185	1,040	468	228	250	.....
59	1880	53	1,327,553	1,042	296,225	527	365	150	106	.....
60	1890	23	1,649,918	914	313,780	482	405	27	57	.....
	Michigan:									
61	1840	4	34,120	37	.....	37	.....	.....	.....	.....
62	1850	15	94,000	129	.....	78	51	.....	.....	.....
63	1860	16	103,950	126	30,672	77	49	.....	14	.....
64	1870	54	1,011,050	667	202,813	408	208	51	116	.....
65	1880	99	558,800	347	76,240	203	114	30	51	.....
66	1890	33	998,087	580	181,803	326	223	31	54	.....
	Wisconsin:									
67	1840	.....	.....	.....	.....	.....	.....	.....	.....	.....
68	1850	9	31,225	25	.....	25	.....	.....	.....	.....
69	1860	15	100,600	105	27,036	74	31	.....	19	.....
70	1870	67	1,247,389	802	230,706	519	211	72	135	.....
71	1880	48	1,349,954	847	214,993	426	378	43	75	.....
72	1890	33	2,496,377	1,087	360,739	521	555	11	63	6

a See note b on page 75.

BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1840–1890—Continued.

AND KNIT GOODS.)

MACHINERY—cont'd.		Cost of materials used.	PRINCIPAL RAW MATERIALS—QUANTITIES CONSUMED.						Value of products.	
			Wool.			Hair, noils, etc. (Pounds.)	Cotton. (Pounds.)	Shoddy. (Pounds.)		
Looms.	Spindles.		Total. (Pounds.)	Foreign. (Pounds.)	Domestic. (Pounds.)					
									$129	1
										2
										3
		$55,782	115,330		115,330				78,660	4
41	1,360	85,972	189,000		189,000		30,600	300	127,430	5
24	735	28,030	67,500		67,500		5,550		38,360	6
									14,200	7
		1,675	6,200						6,310	8
	500	5,225	10,000						8,100	9
80	3,614	503,737	1,030,153		1,030,153		101,449	2,662	696,844	10
107	6,860	423,054	883,338		883,338		180,416	55,433	620,724	11
925	19,038	760,036	1,448,486	187,625	1,260,861		1,462,967	197,690	1,216,419	12
										13
										14
										15
		150	550		550				500	16
										17
										18
										19
										20
		31,300	69,150						45,200	21
160	4,000	19,047	50,325		50,325		1,500		30,795	22
										23
										24
										25
										26
										27
120	6,387	307,051	673,003		673,003				475,703	28
179	8,081	245,843	602,399		602,399		4,000	33,819	356,986	29
153	7,164	202,801	600,823	5,001	595,822		31,200	9,632	328,800	30
									151,246	31
		205,287	673,900						318,819	32
94	3,990	510,902	1,452,500				170,700		845,226	33
322	10,500	831,628	1,639,367		1,630,367		275,250		1,312,458	34
513	14,110	852,405	1,688,663		1,688,663		667,444	117,151	1,264,988	35
1,661	40,340	1,631,860	2,828,377	57,037	2,771,340		2,802,500	785,940	2,721,968	36
									778,448	37
		909,808	2,858,990						1,770,635	38
382	18,980	1,226,844	3,246,751						2,269,300	39
3,984	226,638	10,006,478	20,631,163	157,825	20,473,338		903,027	5,225	16,607,375	40
2,786	156,012	7,087,326	17,702,458	195,000	17,507,458	80,500	1,508,482	660,989	10,722,024	41
3,133	170,869	7,125,149	22,859,293	1,743,013	21,116,280	10,762	2,956,355	943,658	11,673,341	42
									685,757	43
		578,423	1,057,726						1,111,027	44
96	5,827	482,994	1,190,751						843,516	45
1,052	52,789	2,119,869	3,972,234	62,200	3,910,034		175,404		3,407,699	46
638	35,200	1,153,029	2,695,424	165,000	2,530,424	80,000	310,824	134,003	1,779,439	47
712	32,263	1,398,892	3,500,244	474,764	3,025,480	3,900	357,152	199,080	2,280,002	48
									58,867	49
		120,486	413,350						205,802	50
177	8,266	352,362	940,000						649,771	51
1,180	57,083	2,684,315	5,029,618	80,157	4,949,461		513,595		4,329,711	52
814	36,886	1,823,390	4,360,456	10,000	4,350,456		831,776	345,656	2,729,347	53
1,006	46,690	1,880,515	6,324,884	632,883	5,692,051	600	1,961,374	154,303	3,036,682	54
									9,540	55
		115,367	396,964						206,572	56
20	1,000	112,697	327,800						193,388	57
633	36,888	1,701,328	3,560,829		3,560,829		151,650		2,849,240	58
374	20,992	1,332,798	3,003,740		3,003,740		114,531	83,107	1,896,460	59
323	18,745	789,310	2,506,621	59,000	2,507,621		319,179	67,253	1,299,506	60
									9,734	61
		43,402	162,250						90,242	62
20	1,000	69,010	163,100						139,246	63
232	15,050	659,700	1,391,889		1,391,889		3,550		1,204,868	64
107	10,688	356,614	869,025		869,025		5,310	37,163	481,517	65
158	13,559	603,374	2,033,321	408,026	1,625,295		2,440	269,148	988,052	66
										67
		32,630	134,200						87,992	68
20	1,000	85,743	205,000						172,720	69
226	16,445	688,193	1,642,637	15,468	1,627,169		500		1,258,417	70
220	16,380	892,793	2,066,188		2,066,188	500	50,955	35,295	1,480,069	71
258	24,802	1,117,013	3,125,572	164,090	2,961,482	6,262	111,323	196,274	1,844,364	72

TABLE 1.—COMPARATIVE STATEMENT OF WOOL MANUFACTURE FOR THE UNITED STATES,

(EXCLUDING HOSIERY

	STATES AND TERRITORIES.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.					MACHINERY.	
				Aggregates.		Males above 16 years.	Females above 15 years.	Children.	Cards.	Combing machines.
				Average number.	Total wages.					
	Iowa:									
1	1840									
2	1850	1	$10,000	7		7				
3	1860	12	82,500	120	$23,652	96	24		13	
4	1870	85	1,440,484	1,088	269,432	685	293	110	199	
5	1880	34	553,500	499	117,792	307	132	60	56	
6	1890	14	094,600	378	133,240	186	176	16	36	
	Missouri:									
7	1840	9	5,100	13		13				
8	1850	1	20,000	25		15	10			
9	1860	11	103,750	70	19,728	53	17		15	
10	1870	156	710,524	718	137,408	548	85	85	258	
11	1880	98	726,150	680	109,877	412	144	133	126	
12	1890	35	720,616	510	122,410	261	190	59	52	
	Kansas:									
13	1840									
14	1850									
15	1860									
16	1870	9	96,000	91	30,682	56	24	11	24	
17	1880	5	131,925	124	25,825	66	40	18	9	
18	1890 (a)									
	Minnesota:									
19	1840									
20	1850									
21	1860									
22	1870	10	246,600	146	45,592	77	60	9	19	
23	1880	13	190,500	229	46,108	106	73	50	21	
24	1890	21	503,771	341	120,807	193	147	1	37	
	Utah:									
25	1840									
26	1850									
27	1860									
28	1870	15	223,400	106	48,040	58	39	9	19	
29	1880	11	382,000	277	68,108	150	79	48	21	
30	1890	9	579,209	274	104,156	165	95	14	31	
	New Mexico:									
31	1840									
32	1850									
33	1860									
34	1870	1	65,000	20	2,000	20			1	
35	1880									
36	1890									
	All other western states: (a)									
37	1890	4	103,112	58	16,645	25	29	4	5	
	Pacific states:									
38	1840									
39	1850									
40	1860	2	170,000	90	49,800	67	23		10	
41	1870	14	2,174,200	838	342,413	713	39	86	67	
42	1880	20	2,283,300	1,080	424,406	892	149	39	83	
43	1890	14	3,909,065	1,666	462,971	1,167	452	47	91	
	California:									
44	1840									
45	1850									
46	1860	1	100,000	60	33,600	40	20		6	
47	1870	5	1,785,000	659	230,200	584	31	44	46	
48	1880	9	1,676,500	835	334,318	708	108	19	60	
49	1890	8	2,618,480	1,264	287,658	922	318	24	70	
	Oregon:									
50	1840									
51	1850									
52	1860	1	70,000	30	10,200	27	3		4	
53	1870	9	389,200	179	112,213	129	8	42	21	
54	1880	10	566,800	216	86,088	166	33	17	21	
55	1890	6	1,350,585	402	175,313	245	134	23	21	
	Washington:									
56	1840									
57	1850									
58	1860									
59	1870									
60	1880	1	40,000	29	4,000	18	8	3	2	
61	1890									

a Includes states having less than 3 establishments, in order that the operations of individual establishments may not be disclosed. These establishments are distributed as follows: Idaho, 1; Kansas, 1; South Dakota, 2.

BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1840–1890—Continued.

AND KNIT GOODS.)

MACHINERY—cont'd.		Cost of materials used.	PRINCIPAL RAW MATERIALS—QUANTITIES CONSUMED.						Value of products.	
			Wool.			Hair, noils, etc. (Pounds.)	Cotton. (Pounds.)	Shoddy. (Pounds.)		
Looms.	Spindles.		Total. (Pounds.)	Foreign. (Pounds.)	Domestic. (Pounds.)					
									$800	1
		$3,500	14,500						13,000	2
20	1,000	07,293	168,700						127,640	3
374	31,462	998,073	2,273,428		2,273,428		23,148	1,225	1,647,606	4
166	11,025	435,747	1,407,510		1,407,510		18,597	865	679,904	5
158	10,828	505,503	1,880,532	300	1,880,232		10,610	46,000	695,218	6
									13,750	7
		16,000	80,000						56,000	8
29	896	56,745	191,400						143,025	9
183	10,371	849,313	1,979,071		1,979,071		25,500		1,256,213	10
193	12,622	681,711	1,811,635		1,811,635		115,227	4,000	930,961	11
261	12,984	311,881	1,052,229	4,000	1,048,229		155,395	7,000	548,457	12
										13
										14
										15
29	1,616	86,105	200,000		200,000		1,300		153,150	16
41	2,636	107,251	364,000		364,000		23,200	2,000	211,525	17
										18
										19
										20
										21
39	2,664	108,540	254,857		254,857				219,862	22
59	3,852	155,867	557,580	20,000	537,580		6,365	18,000	253,378	23
125	7,510	309,378	1,358,290		1,358,290			4,000	539,995	24
										25
										26
										27
31	1,430	98,272	276,000		276,000		8,320		199,600	28
114	5,422	147,226	566,900		566,900		31,697	1,000	279,424	29
99	7,900	163,864	800,500		800,500		38,632		338,534	30
										31
										32
										33
5	240	12,775	50,000		50,000			4,000	21,000	34
										35
										36
33	1,528	45,419	217,100		217,100		250		101,931	37
										38
										39
45	780	77,000	550,000						235,000	40
275	8,200	835,736	2,871,400		2,871,400		100,000	1,800	1,608,611	41
208	23,388	1,277,025	4,720,100	20,000	4,700,100	25,000	234,026	95,150	2,253,888	42
387	24,050	1,116,418	5,065,619	145,000	4,920,619		213,864	58,111	1,939,965	43
										44
										45
80	500	50,000	400,000						150,000	46
185	3,880	608,141	1,928,000		1,928,000		100,000	1,800	1,102,754	47
230	18,740	997,530	3,574,850	20,000	3,554,850	25,000	228,026	94,150	1,634,858	48
292	18,598	788,916	3,099,471	145,000	2,554,471		107,318	53,111	1,325,033	49
										50
										51
15	280	27,000	150,000						85,000	52
90	4,320	227,595	943,400		943,400				505,857	53
56	4,248	227,486	985,250		985,250		6,000	1,000	549,030	54
95	6,052	327,502	1,366,148		1,366,148		106,546	5,000	614,932	55
										56
										57
										58
										59
12	400	52,000	160,000		160,000				70,000	60
										61

TABLE 2.—COMPARATIVE STATEMENT OF HOSIERY AND KNIT GOODS MANUFACTURE FOR THE

	STATES AND TERRITORIES	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.					MACHINERY.					
				Aggregates.		Males above 16 years.	Females above 15 years.	Children.	Cards.	Combing machines.	Knitting machines.	Sewing machines.	Looms.	Spindles.
				Average number.	Total wages.									
	United States:													
1	1840 (a)													
2	1850 (b)	85	$544,735	2,325	$360,336	835	1,490							
3	1860	197	4,035,510	9,103	1,661,072	2,780	6,323							
4	1870	248	10,931,260	14,788	4,429,085	4,252	7,991	2,545	510		5,625	1,668	438	148,285
5	1880	359	15,579,591	28,885	6,701,475	7,517	17,707	3,661	592	3	12,659	4,569	1,964	143,023
6	1890	796	c50,607,738	61,209	18,263,272	16,366	40,927	3,916	1,183	16	36,327		149	389,353
	New England states:													
7	1840													
8	1850													
9	1860	47	1,534,700	2,165	487,440	815	1,350							
10	1870	84	4,021,660	5,280	1,808,335	1,678	3,059	543	236		2,466	760	214	82,656
11	1880	103	5,156,306	7,818	1,918,715	2,130	4,969	719	207		2,626	816	1,085	46,047
12	1890	108	14,538,511	13,503	4,344,884	3,828	9,208	467	329	9	8,638		5	147,825
	Maine:													
13	1840													
14	1850													
15	1860													
16	1870													
17	1880	1	500	21	801	1	20							
18	1890	4	28,095	260	30,165	6	254				91			
	New Hampshire:													
19	1840													
20	1850													
21	1860	12	133,000	488	76,188	138	350							
22	1870	28	855,460	1,081	405,003	344	624	113	58		832	102	20	17,175
23	1880	24	1,224,000	1,753	536,117	540	1,098	115	68		992	118	147	17,540
24	1890	37	2,706,065	3,178	989,130	1,062	2,040	76	112		3,032			36,526
	Vermont:													
25	1840													
26	1850													
27	1860	2	21,500	93	15,792	30	63							
28	1870	7	303,000	331	90,170	80	216	26	23		49	53		26,300
29	1880	6	492,000	383	101,037	138	227	18	22		69	94		3,805
30	1890	10	754,882	718	269,844	275	438	5	37		221			9,584
	Massachusetts:													
31	1840													
32	1850													
33	1860	15	155,200	388	94,692	166	222							
34	1870	32	1,570,500	2,415	848,864	844	1,404	167	79		1,116	312	180	19,331
35	1880	57	1,467,375	3,411	608,067	786	2,413	212	38		813	257	545	9,028
36	1890	74	4,497,940	4,075	1,495,260	1,127	3,418	130	52		3,344		5	40,822
	Rhode Island:													
37	1840													
38	1850													
39	1860													
40	1870	3	133,000	120	33,200	37	64	19	6		33		5	1,800
41	1880	1	6,000	30	8,400	6	24	9			32	7	4	
42	1890	16	1,728,618	1,538	487,350	365	1,024	149	14	2	755			15,825
	Connecticut:													
43	1840													
44	1850													
45	1860	18	1,225,000	1,196	300,768	481	715							
46	1870	14	1,159,700	1,333	431,089	364	751	218	70		436	293	9	18,050
47	1880	14	1,966,431	2,211	604,293	659	1,187	365	79		720	340	389	15,674
48	1890	27	4,822,911	3,134	1,073,135	993	2,034	107	114	7	1,195			45,068
	Middle states:													
49	1840													
50	1850													
51	1860	134	2,476,210	6,888	1,160,624	1,928	4,960							
52	1870	141	6,873,300	9,305	2,596,360	2,524	4,843	1,998	282		3,091	906	213	65,717
53	1880	190	9,883,486	18,201	4,451,856	5,046	10,645	2,510	378	3	8,423	3,681	833	95,316
54	1890	460	30,231,762	37,823	11,574,128	10,908	24,138	2,777	770	7	20,838		121	213,023
	New York:													
55	1840													
56	1850													
57	1860	22	1,102,500	2,701	392,924	597	2,104							
58	1870	60	3,318,700	3,741	1,122,890	1,061	1,899	781	230		746	620	20	49,441
59	1880	75	5,334,876	7,858	2,036,076	2,389	4,470	999	320		1,311	1,953	103	71,608
60	1890	201	19,608,331	20,299	6,437,308	6,862	12,012	825	701	4	5,434		78	186,057
	New Jersey:													
61	1840													
62	1850													
63	1860	7	477,200	1,401	225,060	329	1,102							
64	1870	4	575,500	722	193,200	136	271	315	13		11	138	147	6,480
65	1880	8	804,570	1,070	239,761	320	604	146	23		345	75		6,048
66	1890	15	1,352,143	1,277	342,600	390	761	117	33		694			9,548
	Pennsylvania:													
67	1840													
68	1850													
69	1860	103	895,460	2,092	541,116	998	1,694							
70	1870	76	2,979,000	4,899	1,280,270	1,325	2,672	902	39		2,332	148	46	9,796
71	1880	106	3,743,790	9,272	2,175,913	2,337	5,570	1,365	35	3	6,769	1,653	730	18,260
72	1890	236	9,121,632	15,941	4,732,754	3,608	10,563	1,770	45	3	14,492		43	17,418

a Not separately reported.
b At the census of 1850 totals for the different states were not published, totals for the United States only being given.

UNITED STATES, BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1840–1890.

Cost of materials used.	PRINCIPAL RAW MATERIALS—QUANTITIES CONSUMED.								Value of products.	
	Wool.			Merino yarn. (Pounds.)	Woolen yarn. (Pounds.)	Worsted yarn. (Pounds.)	Cotton, cotton warp, and yarn. (Pounds.)	Hair, noils, etc. (Pounds.)	Shoddy. (Pounds.)	
	Total. (Pounds.)	Foreign. (Pounds.)	Domestic. (Pounds.)							
$415,113									$1,028,102	1
3,202,317	2,927,626						3,892,342		7,280,666	2
9,835,823	5,596,955	292,300	5,304,655		2,229,777		13,652,225		18,411,564	3
15,210,951	8,594,895	448,758	8,146,137	67,561	3,753,566	75,255	28,485,238	66,929	1,523,263	20,167,227	4
35,861,586	21,630,393	2,734,304	18,905,089		6,386,370	4,146,035	64,681,466	424,406	4,735,144	67,241,013	5
											6
											7
											8
1,092,358	1,457,260						1,693,001			2,374,242	9
3,282,123	2,483,733	141,500	2,342,233		315,419		4,033,943		10,000	6,910,797	10
4,034,873	4,348,024	209,440	4,138,584		674,986	106,201	3,977,864	26,779	366,843	7,912,916	11
8,661,685	8,398,436	1,035,183	7,363,253		869,432	1,020,615	12,214,569	128,525	1,981,598	16,034,801	12
											13
											14
											15
											16
1,800					2,000					3,000	17
33,839					20,075	12,320	6,000			76,603	18
											19
											20
338,075	362,120						808,280			573,794	21
881,646	880,750	40,500	840,250				946,235			1,757,445	22
1,249,600	1,756,332	76,000	1,680,332		96,500	2,500	1,102,284	5,000	186,000	2,362,779	23
1,777,505	3,456,174	243,850	3,212,324		96,658	106,478	841,739	4,200	960,998	3,481,922	24
											25
											26
61,840	130,000						50,000			102,800	27
191,219	146,289		146,289				384,780			551,129	28
959,938	401,333		401,333		1,200	500	406,539		2,525	595,270	29
949,004	576,669	66,000	510,669		2,000		666,448		16,882	1,105,958	30
											31
											32
132,075	196,000						148,000			314,120	33
1,515,326	904,900	25,000	879,900		249,356		1,849,994			3,213,481	34
1,994,748	1,088,684	7,266	1,081,418		502,511	88,610	857,700		8,000	2,483,596	35
2,552,705	1,812,076	52,989	1,759,087		456,440	278,853	4,466,465		44,500	5,082,087	36
											37
											38
											39
68,541	113,000		113,000				30,000			137,000	40
14,838					22,750					36,000	41
1,618,021	788,311	140,000	648,311		108,159	445,033	3,337,264		12,218	2,516,664	42
											43
											44
560,368	769,140						1,186,721			1,383,528	45
625,391	438,794	76,000	362,794		66,663		822,925		10,500	1,251,742	46
1,013,949	1,101,675	126,174	975,501		50,025	14,582	1,611,341	21,779	169,418	2,432,271	47
2,029,921	1,765,206	532,344	1,232,862		177,100	177,331	2,896,593	124,325	47,000	3,771,567	48
											49
											50
2,082,344	1,462,866						2,195,341			4,847,984	51
6,505,973	3,112,622	150,800	2,961,822		1,871,183		9,601,982		179,857	11,405,380	52
10,254,739	4,006,871	239,318	3,767,553	67,561	2,327,394	614,404	24,305,874	40,150	1,146,420	19,696,588	53
23,059,630	10,083,581	1,081,363	9,002,218		3,188,204	2,741,794	47,428,283	241,040	3,174,904	42,993,045	54
											55
											56
870,479	689,066						1,348,941			1,944,090	57
3,391,840	2,168,822	150,800	2,018,022		50,500		7,119,830		179,857	5,528,742	58
5,072,058	2,548,969	186,926	2,362,043		538,467	46,150	16,164,505	40,000	1,062,011	9,899,540	59
13,669,169	9,024,692	882,065	8,142,627		1,034,837	695,260	27,982,069	215,195	3,069,999	24,776,582	60
											61
											62
279,952	419,800						766,400			783,456	63
188,030	230,000		230,000		1,000		216,700			568,900	64
258,043	175,184	5,400	169,784		106,300	3,100	487,026	150	15,553	861,181	65
582,783	404,847	188,839	216,008		113,600	36,620	842,202	10,673	18,023	1,091,403	66
											67
											68
928,915	354,000						80,000			2,114,315	69
2,925,323	713,800		713,800		1,819,183		2,264,943			5,300,738	70
4,924,138	1,282,718	47,502	1,235,126	67,561	1,682,127	565,145	7,654,343		68,856	8,935,147	71
8,720,303	654,042	10,459	643,583		1,985,017	1,995,905	18,488,312	15,181	86,342	16,944,237	72

c Value of hired property is not included in the capital reported in 1890, because it was not included in the reports of previous census years.

TABLE 2.—COMPARATIVE STATEMENT OF HOSIERY AND KNIT GOODS MANUFACTURE FOR THE

	STATES AND TERRITORIES.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.					MACHINERY.					
				Aggregates.		Males above 16 years.	Females above 15 years.	Children.	Cards.	Combing machines.	Knitting machines.	Sewing machines.	Looms.	Spindles.
				Average number.	Total wages.									
	Maryland: (a)													
1	1840													
2	1850													
3	1860	2	$1,050	4	$1,524	4								
4	1870	1	100	3		2	1				2			
5	1880	1	250	1	100		1							
6	1890	8	149,056	306	61,466	39	202	65			218			
	Western states:													
7	1840													
8	1850													
9	1860	13	21,900	46	12,228	33	13							
10	1870	23	36,300	143	24,390	50	89	4	1		68	2	11	12
11	1880	65	534,799	2,862	330,210	339	2,093	430	7		1,609	72	42	1,660
12	1890	146	5,190,366	8,369	2,031,200	1,389	6,687	293	60		6,056		5	22,152
	Ohio:													
13	1840													
14	1850													
15	1860	11	10,900	36	9,264	23	13							
16	1870	5	9,400	22	5,250	16	6				7		10	
17	1880	23	187,000	745	94,858	53	574	118			308	4	30	60
18	1890	44	1,071,007	1,898	466,630	168	1,655	75	8		1,574		5	2,456
	Indiana:													
19	1840													
20	1850													
21	1860													
22	1870	5	4,050	26	510	7	18	1			9	1		
23	1880	5	45,000	284	24,700	26	201	57			183	5		
24	1890	9	716,989	962	207,519	307	594	61	18		670			7,392
	Illinois:													
25	1840													
26	1850													
27	1860													
28	1870	3	1,800	27	1,800	4	21	2	1		19	1		12
29	1880	14	105,800	707	92,385	160	471	76	3		433	48	11	680
30	1890	35	1,254,576	1,878	545,109	349	1,483	46	14		1,525			5,824
	Michigan:													
31	1840													
32	1850													
33	1860													
34	1870													
35	1880	11	147,389	962	92,324	80	706	176	4		521	9		920
36	1890	10	560,917	848	208,344	163	684	1	14		678			3,680
	Wisconsin:													
37	1840													
38	1850													
39	1860													
40	1870													
41	1880	4	10,010	28	3,364	6	20	2			19	4		
42	1890	23	1,214,727	2,296	449,724	335	1,856	105	6		1,138			2,800
	Iowa:													
43	1840													
44	1850													
45	1860													
46	1870	2	5,200	6	1,200	3	3							
47	1880	3	2,200	6	460	3	3				7			
48	1890	3	8,950	9	2,550	3	6				14			
	Missouri:													
49	1840													
50	1850													
51	1860	2	11,000	10	2,964	10								
52	1870	7	15,700	61	15,600	19	41	1			33			
53	1880	4	29,400	118	19,300	3	114	1			68			
54	1890	7	33,247	125	34,477	7	118				145			
	Minnesota:													
55	1840													
56	1850													
57	1860													
58	1870	1	150	1		1							1	
59	1880	1	8,000	12	2,819	8	4				10	2	1	
60	1890	3	247,498	129	46,356	27	102				152			
	Utah:													
61	1840													
62	1850													
63	1860													
64	1870													
65	1880													
66	1890	5	33,370	70	17,020	5	60	5			73			
	All other western states: (b)													
67	1890	7	49,085	154	53,471	25	129				87			

a Maryland is classed in this table as a middle state for purposes of comparison.

UNITED STATES, BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1840–1890—Continued.

Cost of materials used.	PRINCIPAL RAW MATERIALS—QUANTITIES CONSUMED.								Value of products.	
	Wool.			Merino yarn. (Pounds.)	Woolen yarn. (Pounds.)	Worsted yarn. (Pounds.)	Cotton, cotton warp, and yarn. (Pounds.)	Hair, noils, etc. (Pounds.)	Shoddy. (Pounds.)	
	Total. (Pounds.)	Foreign. (Pounds.)	Domestic. (Pounds.)							
										1
										2
$2,998									$6,123	3
780					500		500		1,000	4
500					500				720	5
87,315					54,750	14,000	115,700		180,823	6
										7
										8
21,715	6,500						4,000		46,680	9
47,727	600		600		43,175		16,300		95,387	10
919,639	240,000		240,000		749,786	29,050	201,500		1,555,123	11
3,680,402	3,100,876	617,758	2,483,118		2,328,534	383,626	2,658,199	54,922	338,642	7,240,031	12
										13
										14
13,515	6,500						4,000		31,800	15
10,360					10,600				23,100	16
241,583					241,850	3,850	6,000		418,823	17
914,085	359,000	4,000	355,000		851,313	145,857	296,392		5,000	1,635,948	18
										19
										20
										21
2,842					2,575					5,450	22
103,286					76,300	5,200	30,000			158,200	23
408,195	1,095,253	568,758	526,495		74,098	3,342	202,826	25,762	143,572	827,104	24
										25
										26
										27
5,775	600		600		5,100		100			8,800	28
290,895	60,000		60,000		226,800	10,000	112,900			484,124	29
980,780	818,500		818,500		251,020	72,480	1,348,620	17,500	27,920	1,990,035	30
										31
										32
										33
										34
226,627	180,000		180,000		154,600	5,000	41,300		10,000	377,240	35
285,057	247,081	25,000	222,081		121,667	19,400	332,955		30,037	701,322	36
										37
										38
										39
										40
9,125					7,100	700				18,817	41
899,371	581,042	20,000	561,042		886,786	84,047	267,906	11,600	131,313	1,635,641	42
										43
										44
										45
1,510					300		600			2,887	46
1,554					1,530					2,908	47
1,975					1,275		3,000			5,763	48
										49
										50
8,200										14,880	51
27,040					24,400		15,600			54,650	52
41,575					36,600	4,500	11,300			85,000	53
30,524					30,325		37,500			81,445	54
										55
										56
										57
200					200					500	58
5,000					5,000	400				10,000	59
87,602					64,000	41,000	42,000			183,743	60
										61
										62
										63
										64
										65
25,475					31,375	2,500	500			53,560	66
47,338					16,675	15,000	36,500			125,470	67

b Includes states having less than 3 establishments in this branch of industry, in order that the operations of individual establishments may not be disclosed. These establishments are distributed as follows: California, 2; Colorado, 2; Kansas, 1; Nebraska, 1; Washington, 1.

TABLE 2.—COMPARATIVE STATEMENT OF HOSIERY AND KNIT GOODS MANUFACTURE IN THE UNITED

	STATES.		Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.					MACHINERY.				
					Aggregates.		Males above 16 years.	Females above 15 years.	Children.	Cards.	Combing machines.	Knitting machines.	Looms.	Spindles.
					Average number.	Total wages.								
1	Southern states (*a*)	1860	3	$2,700	4	$1,080	4	.....	.....	.....	.....	.....	.....	.....
2		1880	1	5,000	4	700	2	.....	2	.....	.....	1	4	.....
3		1890	22	647,099	1,514	313,060	241	894	379	15	.....	795	18	6,353
4	Alabama	1890	3	94,373	412	64,838	25	137	250	2	.....	128	.....	.....
5	Georgia	1890	4	121,494	349	71,952	54	221	74	2	.....	225	.....	960
6	Kentucky	1860	3	2,700	4	1,080	4	.....	.....	.....	.....	.....	.....	.....
7	Louisiana	1890	3	106,600	284	51,841	26	258	.....	.....	.....	169	.....	1,800
8	North Carolina	1890	5	72,900	184	30,410	24	105	55	.....	.....	136	.....	512
9	West Virginia	1880	1	5,000	4	700	2	.....	2	.....	.....	1	4	.....
10	All other southern states (*b*)	1890	7	251,732	285	94,019	112	173	.....	11	.....	137	18	3,081

a With the exception of Kentucky and West Virginia, the states in this group did not manufacture hosiery and knit goods until 1890.

STATES, BY GEOGRAPHICAL DIVISIONS AND STATES AND TERRITORIES: 1840-1890—Continued.

Cost of materials used.	PRINCIPAL RAW MATERIALS—QUANTITIES CONSUMED.									Value of products.	
	Wool.			Merino yarn. (Pounds.)	Woolen yarn. (Pounds.)	Worsted yarn. (Pounds.)	Cotton, cotton warp, and yarn. (Pounds.)	Hair, noils, etc. (Pounds.)	Shoddy. (Pounds.)		
	Total. (Pounds.)	Foreign. (Pounds.)	Domestic. (Pounds.)								
$5,900	1,000	.....	.....	.....	.....	.....	.....	.....	.....	$11,700	1
1,700	.....	.....	.....	.....	1,400	.....	.....	.....	.....	2,600	2
459,808	56,500	.....	56,500	.....	200	.....	2,380,475	.....	140,000	973,136	3
103,893	.....	.....	.....	.....	.....	.....	545,400	.....	.....	190,725	4
70,697	.....	.....	.....	.....	.....	.....	486,340	.....	.....	166,850	5
5,000	1,000	.....	.....	.....	.....	.....	.....	.....	.....	11,700	6
58,202	.....	.....	.....	.....	.....	.....	420,000	.....	.....	151,180	7
66,925	.....	.....	.....	.....	.....	.....	277,000	.....	.....	126,875	8
1,700	.....	.....	.....	.....	1,400	.....	.....	.....	.....	2,600	9
160,091	56,500	.....	56,500	.....	200	.....	651,735	.....	140,000	337,506	10

b Includes states having less than 3 establishments in order that the operations of individual establishments may not be disclosed. These establishments are distributed as follows: Florida, 1; Kentucky, 2; Virginia, 2; West Virginia, 2.

TABLE 3.—STATISTICS OF WOOL MANUFACTURE,

	STATES AND TERRITORIES.	Number of establishments.	CAPITAL.				Miscellaneous expenses.	AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES.	
			Value of hired property.	Direct investment.				Aggregates.	
				Aggregate.	Land, buildings, and machinery.	Live assets.		Average number.	Total wages.
1	The United States	2,489	$17,320,780	$296,494,481	$129,721,571	$166,772,910	$19,240,508	219,132	$76,660,742
2	Alabama	9	400	112,698	76,473	36,225	3,841	428	67,963
3	Arkansas	6	.....	27,435	21,800	5,635	752	31	6,231
4	California	10	104,870	2,661,480	1,540,603	1,120,877	171,035	1,375	328,824
5	Connecticut	98	660,334	23,794,374	9,386,218	14,408,156	1,499,495	13,047	4,940,783
6	Delaware	3	.....	450,974	257,000	193,974	27,404	297	103,395
7	Georgia	18	.....	420,033	305,940	114,093	21,492	528	104,353
8	Illinois	58	337,000	2,004,494	1,103,072	1,801,422	178,282	2,792	858,889
9	Indiana	55	57,725	3,086,345	1,703,246	1,983,099	305,940	3,109	817,387
10	Iowa	17	18,000	703,550	301,800	401,750	40,469	387	135,700
11	Kentucky	44	120,700	2,766,683	1,335,527	1,431,156	186,443	2,042	615,055
12	Louisiana	4	12,900	110,000	77,100	32,900	2,728	286	52,517
13	Maine	82	89,400	9,484,925	3,956,686	5,528,239	594,324	5,453	1,991,676
14	Maryland	17	8,600	522,531	285,099	237,432	24,189	689	185,397
15	Massachusetts	293	3,415,001	71,066,526	28,378,202	42,688,324	4,900,703	43,038	16,154,034
16	Michigan	43	142,400	1,559,004	677,397	881,607	118,181	1,428	390,147
17	Minnesota	24	56,300	811,269	437,611	373,658	70,556	470	167,323
18	Mississippi	7	.....	1,553,455	876,030	677,425	18,054	1,082	306,270
19	Missouri	42	46,050	753,863	484,935	268,928	33,578	695	156,887
20	New Hampshire	89	224,900	14,721,780	5,304,506	9,417,280	858,253	9,400	3,341,695
21	New Jersey	50	321,983	7,793,714	3,923,511	3,870,203	649,032	7,248	2,416,371
22	New York	330	2,223,622	46,461,914	22,560,855	23,901,059	2,624,573	37,992	13,033,901
23	North Carolina	32	6,200	411,988	227,330	184,658	17,855	508	95,739
24	Ohio	113	192,810	3,550,879	1,609,893	1,940,986	205,041	3,329	915,656
25	Oregon	6	.....	1,350,585	342,820	1,007,765	86,906	402	175,313
26	Pennsylvania	703	6,305,859	61,142,888	28,086,739	33,056,149	3,963,708	55,354	19,764,386
27	Rhode Island	85	2,552,476	20,039,361	11,660,236	14,379,125	1,978,752	19,325	7,049,109
28	Tennessee	49	2,700	1,393,679	672,013	721,666	56,263	998	239,657
29	Texas	4	.....	371,270	256,130	115,140	17,333	359	138,795
30	Utah	14	28,250	612,579	297,045	315,534	29,301	344	121,176
31	Vermont	39	173,500	4,059,284	1,472,666	2,586,598	241,573	2,303	895,284
32	Virginia	37	38,625	941,071	494,087	446,984	69,537	612	166,798
33	West Virginia	32	3,800	343,881	171,970	171,911	15,708	307	67,380
34	Wisconsin	56	164,825	3,711,104	1,332,273	2,378,831	226,851	3,383	810,463
35	All other states (*b*)	11	11,550	198,879	104,758	94,121	11,266	151	46,098

a Includes pieceworkers and their wages.

ALL CLASSES, BY STATES AND TERRITORIES: 1890.

AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES—continued.											POWER.			
Officers, firm members, and clerks.			Operatives and skilled. (a)				Unskilled.				Steam.			
Males above 16 years.	Females above 15 years.	Wages.	Males above 16 years.	Females above 15 years.	Children.	Wages.	Males above 16 years.	Females above 15 years.	Children.	Wages.	Number of boilers.	Number of engines.	Horse power.	
5,050	223	$5,742,848	89,063	105,338	14,506	$69,050,823	4,333	432	187	$1,867,071	3,077	1,798	152,009	1
6	.....	3,053	29	142	250	64,610	1	.....	.....	300	3	3	115	2
9	.....	2,950	7	12	3	3,281	.....	.....	.....	.....	2	2	35	3
44	.....	44,590	861	418	24	276,411	28	.....	.....	7,823	15	11	1,450	4
227	4	342,728	6,403	5,510	555	4,460,816	277	43	28	137,239	204	100	8,543	5
7	2	12,298	131	110	30	87,625	8	.....	.....	3,472	7	4	230	6
28	.....	17,227	95	292	101	83,654	12	.....	.....	3,472	3	4	59	7
119	4	119,084	678	1,344	70	716,695	34	40	3	23,110	45	33	1,414	8
127	8	117,550	1,053	1,719	172	686,162	38	.....	1	13,675	64	44	2,183	9
38	2	29,670	136	178	15	99,023	15	2	1	6,497	13	8	350	10
89	4	93,228	798	927	178	505,203	30	10	.....	16,624	44	31	2,046	11
7	.....	9,514	20	258	.....	42,643	1	.....	.....	360	2	1	110	12
124	5	138,791	2,962	2,005	150	1,780,960	205	2	.....	71,925	68	18	3,341	13
24	.....	21,350	207	320	133	161,847	5	.....	.....	2,200	10	7	353	14
697	40	1,029,088	20,660	18,725	1,831	14,683,068	1,001	73	11	441,878	615	338	35,687	15
74	3	59,498	391	904	32	323,068	24	.....	.....	7,581	35	26	915	16
34	1	34,381	180	248	1	130,217	6	.....	.....	2,725	14	12	327	17
13	.....	11,280	396	443	224	293,190	6	.....	.....	1,800	10	7	583	18
58	4	31,476	198	304	59	122,513	12	.....	.....	2,898	28	27	748	19
170	7	219,519	3,961	4,688	248	3,007,647	207	107	12	114,529	80	41	2,856	20
124	2	163,553	3,091	3,546	336	2,192,612	149	.....	.....	60,206	112	53	5,342	21
802	26	974,723	13,629	20,772	2,123	11,819,654	598	31	11	239,524	393	248	21,574	22
30	.....	13,561	146	230	84	77,895	18	.....	.....	4,283	13	10	257	23
166	7	153,358	648	2,238	229	747,193	40	1	.....	15,105	86	71	2,291	24
44	.....	32,775	185	134	23	186,983	16	.....	.....	5,555	.....	.....	.....	25
1,340	88	1,384,833	20,693	26,646	5,406	17,923,026	1,038	67	76	456,527	842	498	42,025	26
276	4	366,744	8,672	8,090	1,839	6,521,318	363	44	37	161,047	242	111	14,663	27
69	2	48,620	335	441	120	182,536	24	3	4	8,501	20	15	772	28
17	.....	18,115	113	176	41	115,980	12	.....	.....	4,700	5	4	225	29
20	.....	16,575	145	155	19	103,001	5	.....	.....	1,600	7	5	207	30
57	.....	56,234	1,085	1,039	40	810,438	80	.....	2	28,612	31	18	1,589	31
46	1	23,745	207	224	31	140,059	13	.....	.....	2,994	6	5	247	32
36	1	13,282	136	117	10	53,130	6	.....	1	968	19	17	525	33
120	6	134,150	682	2,396	116	657,422	54	9	.....	18,891	34	21	810	34
8	2	5,305	40	96	4	40,343	1	.....	.....	450	5	5	137	35

b Includes states having less than 3 establishments, in order that the operations of individual establishments may not be disclosed. These establishments are distributed as follows: Colorado, 2; Florida, 1; Idaho, 1; Kansas, 2; Nebraska, 1; South Carolina, 1; South Dakota, 2; Washington, 1.

TABLE 3.—STATISTICS OF WOOL MANUFACTURE, ALL

	STATES AND TERRITORIES.	POWER—continued.						MACHINERY.						
		Water.				Other power.		Cards. (Sets.)	Combing machines.		Spindles.			Looms.
		Water wheels.		Turbine wheels.		Number of motors.	Horse power.		Foreign.	American.	Woolen.	Worsted	Cotton.	
		Number.	Horse power.	Number.	Horse power.									
1	The United States	569	21,678	1,012	63,045	45	672	8,198	674	181	2,329,099	657,324	196,077	69,807
2	Alabama	4	52	2	35			8			160		128	12
3	Arkansas	2	45	1	10			7			735			24
4	California			1	80	1	7	70			18,598			292
5	Connecticut	29	2,228	91	5,685	2	45	646	34		198,320	26,656	5,000	3,640
6	Delaware			4	213			15			7,306			229
7	Georgia	7	135	7	202	1	15	22			4,512			119
8	Illinois			6	285	2	24	71			24,569			323
9	Indiana	9	327	14	364			153		4	48,082		6,000	1,000
10	Iowa	1	12	13	357			36			10,828			158
11	Kentucky	11	112	5	120	2	46	104	3	1	37,971	3,200		1,679
12	Louisiana					1	7	1					1,850	2
13	Maine	44	2,107	68	5,560			387	5		119,418		7,000	2,020
14	Maryland	4	57	6	212			30			8,294		2,856	114
15	Massachusetts	84	4,285	234	21,359			1,897	197	68	541,620	190,814	48,334	16,354
16	Michigan	5	130	13	369			68			17,239			158
17	Minnesota	10	101	5	479			37			7,510			125
18	Mississippi			2	75			31			9,196			376
19	Missouri	7	82	1	10	1	5	52			12,964		20	261
20	New Hampshire	22	1,409	112	6,449	1	5	492	25	4	148,870	21,304	3,000	4,049
21	New Jersey	10	316	20	1,001	2	2	235	26	3	63,065	23,552		1,533
22	New York	94	3,623	151	10,805	8	87	1,403	56	32	289,672	118,704	22,528	5,103
23	North Carolina	14	128	12	282			35			4,682		6,820	169
24	Ohio	15	263	16	289	6	32	112		5	34,699		20	717
25	Oregon			6	487			21			6,052			95
26	Pennsylvania	72	1,745	70	2,007	11	243	1,299	181	10	409,096	126,027	56,913	22,144
27	Rhode Island	22	1,821	63	3,305	6	150	572	146	49	177,072	144,271	34,808	6,607
28	Tennessee	28	300	11	241	1	4	80			19,138		800	925
29	Texas							9			1,900			135
30	Utah			10	270			31			7,960			99
31	Vermont	22	1,474	20	1,375			157			51,423			682
32	Virginia	21	233	16	429			60			14,398			212
33	West Virginia	10	119	3	22			42			7,404			153
34	Wisconsin	22	624	17	547			69	1	5	24,806	2,796		258
35	All other states			3	31			6			1,528			34

CLASSES, BY STATES AND TERRITORIES: 1890—Continued.

COST OF MATERIALS USED.													
Total.	Foreign wool in condition purchased.	Domestic wool in condition purchased.	Shoddy.	Waste and wool noils.	Camel's hair and noils.	Mohair and noils.	All other animal hair.	Raw cotton.	Yarns not made in mill.				
									Woolen.	Worsted.	Cotton.	Mohair.	
$203,095,572	$25,775,078	$72,705,406	$6,929,334	$5,417,429	$1,250,367	$848,533	$1,153,997	$8,568,149	$11,285,379	$23,345,646	$17,985,376	$534,169	1
114,890	.....	3,464	6,000	.....	.....	.....	.....	700	.....	.....	95,742	.....	2
28,030	.....	23,325	.....	2,500	.....	.....	.....	50	.....	.....	1,560	.....	3
823,361	50,750	600,110	8,050	6,000	.....	.....	.....	12,536	7,000	18,291	1,782	1,099	4
12,533,174	1,580,778	4,467,523	563,177	216,645	114,593	88,137	14,225	509,892	227,142	2,317,765	560,154	3,251	5
295,605	6,543	139,658	16,546	40,037	.....	.....	.....	4,063	.....	.....	50,400	.....	6
166,696	10,200	57,574	2,250	397	4,458	.....	.....	13,957	.....	.....	69,419	.....	7
1,770,090	18,340	830,640	23,557	6,000	4,000	.....	.....	37,548	156,655	54,610	459,161	.....	8
2,288,710	229,406	1,454,290	51,305	31,310	5,671	.....	.....	173,278	34,736	11,002	70,305	.....	9
507,478	90	451,223	7,650	.....	.....	.....	.....	.....	1,103	400	3,358	.....	10
1,657,010	17,036	768,244	127,716	5,225	.....	.....	.....	197,764	.....	109,688	227,743	.....	11
58,454	.....	100	.....	.....	.....	.....	.....	30,100	.....	.....	24,000	.....	12
5,709,186	444,313	3,461,423	250,864	62,544	25,938	228,386	90,000	245,329	24,389	33,391	205,923	.....	13
512,170	25,000	298,420	4,000	42,000	.....	.....	.....	1,444	34,130	14,600	38,190	.....	14
44,826,084	7,217,287	18,213,516	2,158,839	829,945	548,240	301,140	154,468	1,174,865	437,762	5,192,064	2,422,344	121,356	15
888,431	81,105	495,614	37,058	23,280	.....	.....	.....	29,497	75,989	16,250	15,324	.....	16
307,040	.....	261,724	500	.....	.....	.....	.....	.....	28,000	34,400	8,562	.....	17
598,039	.....	359,230	7,920	.....	.....	.....	.....	110	.....	.....	91,375	.....	18
342,405	840	259,664	1,256	400	.....	.....	.....	13,471	20,250	.....	15,548	.....	19
8,802,056	1,325,964	4,421,399	508,895	150,557	22,960	34	900	292,931	110,069	339,070	559,208	.....	20
6,033,273	468,281	3,007,825	284,327	236,369	.....	456	45,744	226,766	248,872	461,099	341,066	6,000	21
30,428,307	5,413,769	7,892,206	741,588	1,088,000	227,372	3,540	112,340	2,816,807	999,232	1,661,559	2,240,634	35,500	22
265,283	13,005	122,259	8,000	4,672	.....	.....	3,230	27,009	3,600	.....	67,940	.....	23
2,312,977	142,908	1,114,287	34,768	9,281	680	.....	30	7,208	510,896	153,717	137,054	.....	24
327,502	.....	256,374	700	.....	.....	.....	.....	7,484	.....	.....	11,120	.....	25
53,894,040	5,104,106	11,191,122	1,370,042	1,310,650	246,627	173,672	732,363	2,066,020	7,610,113	8,795,198	8,839,675	323,599	26
21,594,707	3,242,965	9,431,750	393,535	461,667	41,728	53,153	697	429,488	332,419	4,034,951	971,033	43,364	27
760,036	38,218	407,407	33,165	8,272	.....	.....	.....	69,465	.....	.....	166,340	.....	28
188,607	.....	162,000	145	.....	.....	.....	.....	10,220	.....	.....	.....	.....	29
189,339	.....	126,240	.....	64	.....	.....	.....	1,540	20,988	3,287	5,112	.....	30
2,084,167	276,738	948,234	196,458	138,392	1,938	.....	.....	94,869	1,500	12,500	146,056	.....	31
463,040	6,308	305,257	30,479	552	240	.....	.....	60,901	30	.....	9,805	.....	32
210,761	1,389	184,001	1,740	141	.....	.....	.....	1,302	213	.....	4,005	.....	33
2,016,384	59,739	1,007,102	58,804	142,529	5,922	.....	.....	11,415	394,829	81,804	78,760	.....	34
98,240	.....	41,483	.....	.....	.....	.....	.....	.....	5,465	.....	36,808	.....	35

TABLE 3.—STATISTICS OF WOOL MANUFACTURE, ALL

	STATES AND TERRITORIES.	COST OF MATERIALS USED—continued.											
		Yarns not made in mill—Continued.				Oil.	Soap.	Chemicals and dyestuffs.	Fuel.			Rent of power and heat.	All other materials.
		Silk.	Spun silk.	Jute.	Linen.				Total.	Coal.	Wood.		
1	The United States	$1,395,176	$591,226	$1,709,461	$1,621,293	$1,374,049	$1,319,203	$6,453,665	$3,892,456	$3,666,204	$226,252	$279,730	$8,600,450
2	Alabama	.....	.....	.....	.....	353	.....	675	2,148	2,043	105	.....	5,808
3	Arkansas	.....	.....	.....	.....	105	110	50	200	200	.....	50	20
4	California	1,020	6,750	.....	.....	13,405	19,847	28,881	39,761	25,296	14,465	400	7,679
5	Connecticut	144,200	52,970	46,577	49,805	95,934	87,931	470,674	311,712	282,289	29,423	2,455	598,634
6	Delaware	.....	.....	.....	.....	1,144	5,221	9,671	2,410	2,410	.....	.....	20,512
7	Georgia	.....	.....	.....	.....	893	465	1,994	2,394	1,133	1,261	.....	2,695
8	Illinois	36,385	10,200	.....	8,000	9,461	15,863	37,795	29,808	29,758	50	3,820	28,247
9	Indiana	555	.....	.....	.....	14,112	23,361	113,217	45,122	44,612	510	1,030	29,020
10	Iowa	.....	.....	.....	.....	3,881	6,081	21,212	6,472	3,953	2,519	.....	6,011
11	Kentucky	.....	.....	.....	.....	9,715	3,692	68,401	29,433	28,834	599	300	92,053
12	Louisiana	.....	.....	.....	.....	100	.....	550	2,352	2,352	.....	450	802
13	Maine	225	5,565	.....	.....	49,279	55,393	256,228	150,549	103,571	46,978	4,678	114,769
14	Maryland	.....	.....	.....	.....	2,570	1,462	13,733	9,729	9,639	90	.....	26,892
15	Massachusetts	204,377	109,299	203,047	332,949	303,969	294,850	1,701,278	1,059,019	1,033,365	25,654	59,012	1,795,449
16	Michigan	36,925	1,300	.....	.....	6,381	13,608	16,476	21,886	14,636	7,250	1,890	15,848
17	Minnesota	9,016	.....	.....	.....	4,263	5,998	9,464	8,374	6,477	1,897	2,142	24,657
18	Mississippi	.....	.....	.....	.....	2,263	4,277	13,400	13,455	750	12,705	.....	16,000
19	Missouri	.....	.....	.....	.....	4,060	1,877	8,215	8,882	7,812	1,070	944	6,998
20	New Hampshire	23,079	1,660	.....	.....	62,792	74,734	367,358	231,983	194,634	37,349	17,418	290,955
21	New Jersey	6,371	13,430	37,061	6,437	52,092	55,327	234,853	119,769	119,769	.....	3,685	177,493
22	New York	176,788	61,654	854,745	693,635	180,414	229,362	839,987	507,244	504,880	2,364	37,709	3,014,066
23	North Carolina	.....	.....	.....	.....	1,241	1,400	4,950	2,775	875	1,900	100	5,102
24	Ohio	10,380	4,090	300	820	14,543	23,295	62,616	32,652	31,662	990	2,301	50,491
25	Oregon	57	.....	.....	.....	4,550	6,617	27,591	5,759	.....	5,759	250	7,000
26	Pennsylvania	479,623	236,136	567,731	529,647	368,370	247,696	1,346,081	694,977	693,638	1,339	96,745	1,563,547
27	Rhode Island	252,725	94,921	.....	.....	124,165	94,889	626,354	438,352	419,148	19,204	32,394	494,148
28	Tennessee	.....	.....	.....	.....	4,737	1,272	14,823	14,650	12,523	2,127	270	1,417
29	Texas	.....	.....	.....	.....	738	2,060	7,800	3,128	3,125	3	.....	1,916
30	Utah	250	.....	.....	.....	2,296	2,917	8,692	5,423	5,413	10	450	12,080
31	Vermont	4,600	58	.....	.....	17,228	21,252	65,266	44,430	40,020	4,410	3,141	111,507
32	Virginia	.....	.....	.....	.....	5,240	4,426	14,487	5,488	4,703	785	.....	19,827
33	West Virginia	.....	.....	.....	.....	2,267	2,197	7,973	4,505	4,285	220	300	728
34	Wisconsin	8,600	2,193	.....	.....	11,356	11,343	50,865	35,619	30,868	4,751	7,648	47,856
35	All other states	.....	.....	.....	.....	132	80	2,655	1,996	1,531	465	148	9,383

CLASSES, BY STATES AND TERRITORIES: 1890—Continued.

VALUE OF PRODUCTS.														
Total.	All woolen woven goods.	Union or cotton mixed woven goods.	Goods woven on cotton warps, weft partly or wholly of wool or hair.	Upholstery goods and sundries—woolen.	All worsted woven goods.	Goods woven on cotton warps, weft partly or wholly of worsted.	Upholstery goods and sundries—worsted.	Carpets and rugs.	Felt goods.	Wool hats.	Hosiery and knit goods.	Partly manufactured products for sale.	All other products.	
$337,768,524	$55,892,360	$24,304,966	$39,794,997	$193,863	$26,427,833	$23,592,084	$3,440,270	$46,464,417	$3,120,293	$5,229,176	$63,416,497	$39,433,835	$6,457,933	1
207,875	.....	.....	10,800	.....	.....	.....	.....	.....	.....	.....	190,725	6,350	.....	2
38,360	400	2,110	16,000	.....	.....	.....	.....	.....	.....	.....	.....	19,850	.....	3
1,421,903	716,576	601,032	7,425	.....	.....	.....	.....	.....	.....	.....	38,470	.....	58,400	4
20,843,965	3,861,980	3,695,312	1,548,614	65,000	4,425,471	130,250	305,000	2,184,210	257,442	448,375	3,063,661	58,907	199,743	5
482,022	310,662	162,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,360	.....	6
340,095	.....	3,673	149,372	.....	.....	.....	.....	.....	.....	.....	166,850	20,160	40	7
3,289,541	1,068,636	500	178,550	.....	.....	.....	.....	.....	.....	.....	1,913,526	113,720	14,609	8
3,863,786	1,738,664	142,066	694,100	.....	.....	3,929	.....	.....	.....	.....	670,564	432,623	181,840	9
700,981	569,792	.....	28,378	.....	.....	.....	.....	.....	.....	.....	7,438	94,548	825	10
2,784,768	24,315	.....	2,084,492	.....	.....	293,750	.....	.....	.....	.....	44,000	319,411	18,800	11
152,455	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	139,060	900	11,895	12
8,814,256	4,468,911	1,335,243	2,030,536	.....	1,350	174,322	345,342	.....	107,239	147,748	76,603	126,962	.....	13
760,339	572,156	200	.....	.....	.....	.....	.....	700	.....	.....	180,823	6,460	.....	14
72,081,408	17,568,523	5,811,961	10,695,826	.....	6,704,964	7,532,367	354,286	7,003,956	842,890	1,700,486	4,725,024	9,289,694	451,431	15
1,689,974	630,626	360	9,465	.....	.....	.....	.....	.....	.....	.....	607,551	184,592	257,380	16
723,738	464,550	.....	.....	.....	.....	.....	.....	.....	.....	.....	181,928	75,445	1,815	17
924,185	4,900	450	864,760	.....	.....	.....	.....	.....	.....	.....	.....	54,075	.....	18
629,902	200,960	99,497	50,835	.....	.....	.....	.....	.....	.....	.....	81,628	196,982	.....	19
14,445,172	3,287,023	1,941,582	2,525,856	.....	225,438	2,403,120	3,090	.....	150,010	.....	3,413,618	412,178	83,257	20
9,984,640	2,104,191	2,178,644	1,089,596	.....	332,690	150,000	215,302	579,522	432,285	.....	1,077,452	1,811,584	13,365	21
53,340,151	3,740,046	1,422,239	1,159,550	40,000	1,834,785	1,026,716	215,270	14,280,442	824,712	1,489,132	23,404,469	1,575,896	2,236,894	22
435,821	58,570	330	146,440	.....	.....	.....	.....	.....	.....	.....	126,625	103,606	250	23
3,915,950	895,664	1,754	249,652	.....	.....	360,000	.....	60	367,100	.....	1,614,640	403,220	23,860	24
614,932	123,938	161,040	310,103	.....	.....	.....	.....	.....	.....	.....	15,267	4,584	.....	25
89,337,419	5,294,021	3,733,950	11,498,213	60,263	2,075,958	4,949,164	1,365,656	22,414,127	138,615	1,443,435	15,742,440	17,355,801	2,065,776	26
34,722,493	5,335,846	1,328,383	2,446,404	28,600	10,227,168	6,489,037	636,324	1,200	.....	.....	2,316,970	5,821,967	89,694	27
1,216,419	46,085	6,063	995,467	.....	.....	.....	.....	.....	.....	.....	.....	168,804	.....	28
359,230	.....	181,000	126,000	.....	.....	.....	.....	.....	.....	.....	.....	52,230	.....	29
392,094	197,260	64,569	33,986	.....	.....	.....	.....	.....	.....	.....	47,960	41,184	7,135	30
3,829,641	648,542	1,199,453	764,876	.....	.....	78,529	.....	.....	.....	.....	1,105,958	30,283	2,000	31
788,809	382,294	66,280	69,065	.....	.....	.....	.....	200	.....	.....	179,000	91,970	.....	32
350,132	200,160	28,780	9,796	.....	.....	.....	.....	.....	.....	.....	21,332	89,904	160	33
3,480,005	1,278,267	136,495	.....	.....	.....	.....	.....	.....	.....	.....	1,478,752	447,727	138,764	34
206,063	98,802	.....	840	.....	.....	.....	.....	.....	.....	.....	93,563	12,858	.....	35

TABLE 4.—SUMMARY OF STATISTICS OF WOOL MANUFACTURE,

	CLASSES.	Number of establishments.	CAPITAL.							
			Value of hired property.	Direct investment.						
				Aggregate.	Value of plant.				Live assets.	
					Total.	Land.	Buildings.	Machinery, tools, and implements.	Total.	Raw materials.
1	Total	2,489	$17,320,780	$296,494,481	$129,721,571	$14,954,323	$40,144,544	$74,622,704	$166,772,910	$45,330,372
2	Woolen mills	1,311	6,859,174	130,989,940	57,820,243	6,534,819	19,332,576	31,952,849	73,169,697	19,494,122
3	Worsted mills	143	4,109,526	68,085,116	27,390,810	2,842,769	7,992,865	17,085,176	40,194,306	10,844,736
4	Carpet mills (other than rag)	173	1,278,150	38,208,842	17,375,384	2,884,139	5,559,458	8,931,787	20,833,458	6,754,041
5	Felt mills	34	128,400	4,460,621	1,865,984	270,780	714,453	874,751	2,594,637	835,694
6	Wool hat mills	32	226,960	4,142,224	1,194,389	144,350	381,105	668,934	2,947,835	900,459
7	Hosiery and knitting mills	796	4,718,570	50,607,738	23,574,761	2,271,466	6,194,088	15,109,207	27,032,977	6,501,320

	CLASSES	POWER.								MACHINERY.		
		Steam.			Water.				Other power.		Combing machines.	
		Number of boilers.	Number of engines.	Horse power.	Water wheels.		Turbine wheels.		Number of motors.	Horse power.	Cards. (Sets.)	Foreign.	American.
					Number.	Horse power.	Number.	Horse power.					
8	Total	3,077	1,798	152,009	569	21,678	1,012	63,045	45	672	8,198	674	181
9	Woolen mills	1,547	879	67,192	460	15,249	732	39,783	13	276	5,243	39	9
10	Worsted mills	519	274	36,727	26	2,118	84	10,272	9	216	953	544	129
11	Carpet mills (other than rag)	207	130	20,146	6	296	16	2,236	1	7	302	77	41
12	Felt mills	74	51	3,155	9	417	14	1,479	.....	.....	198	.....	.....
13	Wool hat mills	64	34	2,781	5	280	5	234	.....	.....	220	.....	.....
14	Hosiery and knitting mills	576	430	22,008	63	3,319	161	9,041	22	173	1,183	14	2

	CLASSES.	MACHINERY—Continued.						MATERIALS USED.				
		Looms, on carpets and rugs—Continued.					Knitting machines.	Total cost.	Foreign wool in condition purchased.		Domestic wool in condition purchased.	
		Moquette power looms.	Velvet power looms.	Wilton power looms.	Rug hand looms.	Rug power looms.			Pounds.	Cost.	Pounds.	Cost.
15	Total	462	58	62	1,832	578	36,462	$203,095,572	114,116,612	$25,775,078	258,680,801	$72,765,406
16	Woolen mills	.....	.....	.....	22	.....	103	82,270,335	16,822,138	$4,110,488	168,485,806	$44,749,323
17	Worsted mills	.....	.....	.....	.....	.....	32	50,706,769	37,809,023	10,697,129	59,832,451	17,080,158
18	Carpet mills (other than rag)	462	58	62	1,810	578	.....	28,644,905	54,742,234	9,422,031	2,139,332	433,756
19	Felt mills	.....	.....	.....	.....	.....	.....	2,809,937	1,089,588	448,350	5,039,495	1,393,092
20	Wool hat mills	.....	.....	.....	.....	.....	.....	2,802,041	259,325	75,615	4,278,028	1,373,184
21	Hosiery and knitting mills	.....	.....	.....	.....	.....	36,327	35,861,585	2,734,304	1,127,465	18,905,089	7,126,953

	CLASSES.	MATERIALS USED—continued.									
		Yarns not made in mill.									
		Woolen yarn.		Worsted yarn.		Cotton yarn.		Mohair yarn.		Silk yarn.	
		Pounds.	Cost.	Pounds.	Cost.	Pounds.	Cost.	Pounds.	Cost.	Pounds	Cost.
22	Total	31,385,664	$11,285,379	28,813,717	$23,345,646	83,624,868	$17,985,376	738,777	$534,169	244,306	$1,395,176
23	Woolen mills	4,982,919	3,000,984	2,560,619	2,540,667	23,900,406	5,239,928	324,181	297,905	120,571	632,545
24	Worsted mills	903,174	355,502	11,551,264	11,814,625	9,454,874	2,441,972	232,071	212,364	46,188	344,556
25	Carpet mills (other than rag)	18,763,201	4,112,324	10,555,799	4,711,249	17,920,498	2,712,484	182,400	23,712	.....	.....
26	Felt mills	.....	.....	.....	.....	10,241	2,019	.....	.....	.....	.....
27	Wool hat mills	350,000	24,982	.....	.....	.....	.....	.....	.....	.....	.....
28	Hosiery and knitting mills	6,386,370	3,791,497	4,146,035	4,279,105	32,248,849	7,588,973	125	98	77,507	418,075

a Includes officers, firm members, and clerks. For detailed information see Table 11.

BY CLASSES, FOR THE UNITED STATES: 1890.

CAPITAL—continued.		MISCELLANEOUS EXPENSES.							AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES. (a)		
Direct investment—Continued.											
Live assets—Continued.											
Stock in process and finished products on hand.	Cash, bills and accounts receivable, and all sundries not elsewhere reported.	Total.	Rent paid for tenancy.	Taxes.	Insurance.	Repairs, ordinary, of buildings and machinery.	Interest paid on cash used in the business.	Sundries not elsewhere reported.	Employés.	Wages.	
$64,022,114	$57,420,424	$19,249,508	$1,348,818	$1,174,793	$1,353,049	$3,179,531	$5,841,963	$6,351,354	219,132	$76,660,742	1
29,489,237	24,186,338	8,402,623	541,807	530,236	647,602	1,390,810	2,865,941	2,426,227	79,351	28,478,031	2
15,666,658	13,742,912	4,917,760	296,237	297,713	250,385	808,820	1,595,813	1,698,792	43,593	15,880,183	3
5,705,756	8,373,661	1,819,441	108,997	102,468	125,280	275,555	349,378	791,763	29,121	11,633,116	4
824,370	934,573	232,871	12,648	16,000	29,825	49,686	51,756	72,954	2,266	1,041,296	5
1,029,917	1,017,459	249,568	19,070	13,432	26,703	36,033	79,134	75,196	3,592	1,363,944	6
11,366,176	9,165,481	3,627,245	370,059	178,944	273 254	618,627	899,930	1,286,422	61,209	18,263,272	7

MACHINERY—continued.														
Spindles.			Looms on woolen and worsted goods.					Looms on carpets and rugs.						
Woolen.	Worsted.	Cotton.	Broad looms on woolen goods.	Broad looms on worsted goods.	Narrow looms on woolen goods.	Narrow looms on worsted goods.	Hand looms.	Ingrain hand looms.	Ingrain power looms.	Venetian hand looms.	Venetian power looms.	Tapestry brussels power looms.	Body brussels power looms.	Axminster power looms.	
2,329,099	657,324	196,077	20,848	8,482	17,653	11,447	448	638	4,215	158	109	1,498	1,224	95	8
1,742,288	19,750	53,342	19,028	1,037	17,289	1,436	208	7	1	.....	.....	.....	.....	.....	9
207,180	479,675	68,225	1,366	7,445	297	9,936	51	.....	.....	.....	.....	.....	.....	.....	10
53,046	151,132	4,680	194	.....	44	.....	99	631	4,214	157	109	1,498	1,224	95	11
13,829	.....	.....	200	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13
312,756	6,767	66,830	60	.....	13	75	.....	.....	.....	1	.....	.....	.....	.....	14

MATERIALS USED—continued.												
Total foreign and domestic wool in scoured pounds.	Shoddy.		Waste and wool noils.		Camel's hair and noils.		Mohair and noils.		All other animal hair.		Raw cotton.	
	Pounds.	Cost.	Pounds.	Cost.	Pounds.	Cost.	Pounds.	Cost.	Pounds.	Cost.	Pounds.	Cost.
214,945,513	61,561,619	$6,929,334	23,370,056	$5,417,420	7,084,804	$1,250,367	2,136,244	$848,533	16,805,764	$1,153,097	75,428,865	$8,508,149
100,226,094	51,802,397	5,398,617	13,608,369	2,353,364	1,781,240	289,970	60,553	15,991	9,619,277	493,402	36,993,712	4,198,527
54,989,746	2,608,831	347,006	1,391,444	466,648	4,411,543	672,392	2,038,732	824,869	1,083,690	120,585	3,881,743	438,637
35,726,837	598,512	39,295	860,246	146,876	1,001,929	140,175	32,302	5,456	3,645,096	373,823	1,725,761	181,637
4,213,230	1,450,384	179,505	1,344,619	262,887	68,250	3,071	.....	.....	2,355,928	48,301	395,632	37,133
3,018,114	306,351	35,963	662,092	166,162	11,688	5,610	4,508	2,130	147,600	113,878	.....	.....
16,771,492	4,735,144	878,948	5,503,286	2,021,492	410,154	139,149	169	87	14,173	3,918	32,432,617	3,712,215

MATERIALS USED—continued.															
Yarns not made in mill—Continued.						Oil.		Soap.		Chemicals and dyestuffs.	Fuel.			Rent of power and heat.	All other materials.
Spun silk yarn.		Jute yarn.		Linen yarn.							Total cost.	Coal.	Wood.		
Pounds	Cost.	Pounds.	Cost.	Pounds.	Cost.	Gallons.	Cost.	Pounds.	Cost.	Cost.		Cost.	Cost.	Cost.	Cost.
131,529	$501,220	23,795,444	$1,709,461	10,123,816	$1,621,293	4,243,618	$1,374,049	39,290,827	$1,319,203	$6,453,665	$3,892,456	$3,666,204	$226,252	$279,730	$8,600,450
69,358	281,211	125,327	13,181	2,529	895	2,439,573	773,839	18,572,964	614,997	3,213,929	1,711,169	1,528,208	182,961	108,669	2,230,554
19,427	127,775	.....	.....	100,350	50,473	664,750	258,476	9,486,021	333,288	1,445,965	1,048,245	1,026,320	21,925	62,427	1,060,587
.....	.....	23,670,117	1,696,280	9,719,242	1,504,590	546,734	184,891	3,118,925	101,499	978,877	446,501	446,251	250	18,055	1,411,394
.....	.....	.....	.....	.....	.....	41,240	14,704	834,205	32,718	122,100	92,551	90,553	1,998	750	172,816
.....	.....	.....	.....	.....	.....	22,817	7,102	631,476	23,357	128,741	84,904	84,904	.....	2,250	707,663
42,744	182,240	.....	.....	301,695	65,335	528,504	135,037	6,647,236	212,844	564,053	509,086	489,968	19,118	87,579	3,017,436

TABLE 4.—SUMMARY OF STATISTICS OF WOOL MANUFACTURE,

	CLASSES.	PRODUCTS.									
		Aggregate value.	All wool woven goods.								
			Total.		Cloths, doeskins, cassimeres, cheviots, indigo flannels, and broadcloths for men's wear.		Overcoatings, cloakings, and kerseys for both men's and women's wear.		Carriage cloths of all weights.	
			Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.
1	Total	$337,768,524	101,299,065	$55,892,360	25,637,698	$24,076,808	4,826,767	$5,746,015	1,282,921	$626,791
2	Woolen mills	133,577,977	95,807,636	51,205,385	23,008,903	21,648,649	4,020,612	4,695,723	1,282,921	626,791
3	Worsted mills	79,194,052	4,899,230	4,109,368	2,258,947	2,067,982	806,155	1,050,292	.....	.....
4	Carpet mills (other than rag)	47,770,193	111,862	80,300	.....	.....	.....	.....	.....	.....
5	Felt mills	4,654,768	579,337	497,307	370,148	360,177	.....	.....	.....	.....
6	Wool hat mills	5,329,921	.....	.....	.....	.....	.....	.....	.....	.....
7	Hosiery and knitting mills	67,241,013	.....	.....	.....	.....	.....	.....	.....	.....

	CLASSES.	PRODUCTS—continued.									
		Union or cotton mixed woven goods.									
		Total.		Unions, tweeds, cheviots, cassimeres, or other goods for men's wear.		Overcoatings and clonkings.		Sackings, tricots, and dress goods for women's wear.		Flannels and linseys.	
		Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.
8	Total	56,322,882	$24,304,966	21,042,283	$12,720,597	4,379,128	$3,141,111	9,892,377	$2,532,598	11,021,679	$3,314,733
9	Woolen mills	54,385,108	23,009,976	20,023,283	12,103,503	3,528,942	2,497,092	9,892,377	2,532,598	11,021,679	3,314,733
10	Worsted mills	1,937,774	1,294,990	1,019,000	617,094	850,186	644,019	.....	.....	.....	.....
11	Carpet mills (other than rag)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	Felt mills	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	Wool hat mills	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	Hosiery and knitting mills	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

	CLASSES.	PRODUCTS—continued.											
		Goods woven on cotton warps, weft partly or wholly of wool or hair—Continued.								Upholstery goods and sundries—wool.			
		Wool-filling dress goods and repellents.		Flannels and shirtings.		Blankets.		Jeans, kerseys, and linseys.		Total value.	Tapestry, terry, rep, and damask.		
		Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.		Square yards.	Value.	
15	Total	17,655,803	$4,274,012	16,778,222	$4,795,797	10,929,529	$3,068,606	17,126,217	$4,738,034	$193,863	136,882	$100,263	
16	Woolen mills	17,150,803	4,184,262	16,729,685	4,782,829	8,703,822	2,546,338	17,126,217	4,738,034	133,600	35,000	40,000	
17	Worsted mills	505,000	89,750	33,390	6,104	2,225,707	522,328	.....	.....	.....	.....	.....	
18	Carpet mills (other than rag)	.....	.....	.....	.....	.....	.....	.....	.....	60,263	101,882	60,263	
19	Felt mills	.....	.....	15,147	6,864	.....	.....	.....	.....	.....	.....	.....	
20	Wool hat mills	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
21	Hosiery and knitting mills	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

	CLASSES.	PRODUCTS—continued.					
		Goods woven on cotton warps, weft partly or wholly of worsted.					
		Total.		Cassimeres, doeskins, coatings, suitings, and other goods for men's wear.		Worsted-filling dress goods, delaines, cashmeres, serges, and other stuffs for women's wear.	
		Square yards.	Value.	Square yards.	Value.	Square yards.	Value.
22	Total	78,021,820	$23,592,084	10,878,800	$9,913,126	62,557,940	$12,423,438
23	Woolen mills	5,268,142	2,000,031	568,597	503,225	3,531,356	990,904
24	Worsted mills	72,753,678	21,592,053	10,310,203	9,349,901	59,026,584	11,432,534
25	Carpet mills (other than rag)	.....	.....	.....	.....	.....	.....
26	Felt mills	.....	.....	.....	.....	.....	.....
27	Wool hat mills	.....	.....	.....	.....	.....	.....
28	Hosiery and knitting mills	.....	.....	.....	.....	.....	.....

	CLASSES.	PRODUCTS—continued.	
		Linings, Italian cloths, and lastings.	
		Square yards.	Value.
22	Total	4,585,080	$1,255,520
23	Woolen mills	1,168,189	445,902
24	Worsted mills	3,416,891	809,618
25	Carpet mills (other than rag)	.....	.....
26	Felt mills	.....	.....
27	Wool hat mills	.....	.....
28	Hosiery and knitting mills	.....	.....

BY CLASSES, FOR THE UNITED STATES: 1890—Continued.

PRODUCTS—continued.

All wool woven goods—Continued.

Dress goods, sackings, tricots, ladies' cloth, broadcloth, and other goods for women's wear.		Flannels.		Blankets.		Horse blankets.		Carriage robes.		Woven shawls, wool or worsted.		
Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	
25,237,390	$9,014,477	32,795,000	$10,472,019	5,059,725	$2,604,574	924,049	$516,249	775,963	$646,904	4,758,652	$2,098,523	1
24,608,977	8,769,257	32,762,273	10,458,557	4,666,057	2,532,324	666,025	357,411	257,298	145,019	4,533,970	1,971,654	2
628,413	245,220	17,182	2,662	356,000	141,250	97,548	52,258	411,303	422,895	224,682	126,869	3
						4,500	1,250	107,362	79,050			4
		16,145	10,800	37,668	21,000	155,376	105,330					5
												6
												7

PRODUCTS—continued.

Union or cotton mixed woven goods—Continued.				Goods woven on cotton warps, weft partly or wholly of wool or hair.							
Blankets.		Horse blankets.		Total.		Cassimeres, doeskins, coatings, suitings, and other goods for men's wear.		Overcoatings and cloakings.		Satinets.	
Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.
4,804,390	$1,390,660	4,583,025	$1,205,267	116,586,568	$39,794,997	29,788,143	$14,426,731	5,677,998	$4,195,675	18,630,656	$4,296,082
4,804,390	1,390,660	4,514,437	1,171,390	111,027,431	37,199,986	27,882,734	13,273,684	4,814,989	3,387,061	18,619,181	4,287,778
		68,588	33,877	5,517,176	2,569,617	1,890,070	1,142,821	863,009	808,614		
				41,961	25,394	15,339	10,226			11,475	8,304

PRODUCTS—continued.

Upholstery goods and sundries—wool—Continued.					All worsted woven goods.						
Braids and braiding.		Picture cord.		Total braids and braiding and picture cord.	Total.		Coatings: serges and suitings for men's wear.		Dress goods, cashmeres, serges, and other goods for women's wear.		Buntings.	
Running yards.	Value.	Running yards.	Value.	Running yards.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.
60,000	$28,000	50,000,000	$65,000	50,060,000	29,507,286	$26,427,833	17,591,087	$22,386,452	11,349,319	$3,905,398	566,880	$135,983
60,000	28,000	50,000,000	65,000	50,060,000	3,048,248	2,626,174	2,030,928	2,245,287	1,017,320	380,887		
					26,459,038	23,801,659	15,560,159	20,141,165	10,331,999	3,524,511	566,880	135,983

PRODUCTS—continued.

Upholstery goods and sundries—worsted.							Total carpets and rugs.	Carpets.					
Total value.	Worsted or mohair goods, tapestry, plush, terry, and rep.		Braids and braiding.		Webbings, gorings, elastic fabrics, bindings, fringes, and other sundries.			Ingrain, 2-ply.		Ingrain, 3-ply.		Ingrain, art.	
	Square yards.	Value.	Running yards.	Value.	Running yards.	Value.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.
$3,440,270	3,994,406	$2,265,618	82,545,251	$993,022	1,254,500	$181,630	$46,464,417	32,921,489	$13,781,984	3,251,368	$1,816,484	553,513	$325,984
1,330,332	2,810,158	1,066,972	115,000	106,000	1,092,700	157,360	7,334	2,830	1,290				
2,019,636	1,096,293	1,108,344	82,430,251	887,022	161,800	24,270							
90,302	87,955	90,302					46,457,083	32,918,659	13,780,694	3,254,368	1,816,484	553,513	325,984

TABLE 4.—SUMMARY OF STATISTICS OF WOOL MANUFACTURE,

	CLASSES.	PRODUCTS—continued.									
		Carpets—Continued.									
		Tapestry brussels.		Body brussels.		Tapestry velvet.		Wilton or wilton velvet.		Axminster.	
		Running yards.	Value.	Running yards.	Value.	Running yards.	Value.	Running yards.	Value.	Running yards.	Value.
1	Total	20,008,961	$11,475,846	9,442,348	$8,107,549	2,482,128	$2,239,166	1,030,101	$1,582,409	379,841	$473,165
2	Woolen mills									500	250
3	Worsted mills										
4	Carpet mills (other than rag)	20,008,961	11,475,846	9,442,348	8,107,549	2,482,128	2,239,166	1,030,101	1,582,409	379,341	472,915
5	Felt mills										
6	Wool hat mills										
7	Hosiery and knitting mills										

	CLASSES.	PRODUCTS—continued.											
		Rugs—Continued.				Felt goods.							
		Smyrna.		Other woolen.		Total		Cloths.		Trimmings and linings.		Skirts and skirting.	
		Number.	Value.	Number.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.
8	Total	1,430,036	$2,368,000	26,845	$73,817	6,950,001	$3,120,293	2,628,546	$986,888	1,176,114	$90,738	1,800	$1,200
9	Woolen mills	500	1,000			37,619	22,815	20,000	6,000			1,800	1,200
10	Worsted mills					1,009	1,524	1,009	1,524				
11	Carpet mills (other than rag)	1,429,536	2,367,000	26,845	73,817	103,258	67,118						
12	Felt mills					6,808,115	3,028,836	2,607,537	979,364	1,176,114	90,738		
13	Wool hat mills												
14	Hosiery and knitting mills												

	CLASSES.	PRODUCTS—continued.								
		Wool hats.						Hosiery and knit goods.		
		Total.		Wool hats.		All other hats.		Total value.	Woolen half hose.	
		Dozens.	Value.	Dozens.	Value.	Dozens.	Value.		Dozens.	Value.
15	Total	1,046,481	$5,229,176	972,475	$4,612,151	74,006	$617,025	$63,416,497	1,363,062	$2,900,143
16	Woolen mills	100	300	100	300			97,770	2,238	7,321
17	Worsted mills									
18	Carpet mills (other than rag)									
19	Felt mills									
20	Wool hat mills	1,046,381	5,228,876	972,375	4,611,851	74,006	617,025			
21	Hosiery and knitting mills							63,318,727	1,360,824	2,892,822

	CLASSES.	PRODUCTS—continued.							
		Hosiery and knit goods—Continued.							
		All cotton shirts and drawers.		Leggings and gaiters.		Gloves and mittens.		Hoods, scarfs, nubias, etc.	
		Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	Dozens.	Value.
22	Total	3,247,090	$9,032,221	25,072	$85,401	808,081	$1,042,080	342,497	$1,476,430
23	Woolen mills	500	8,000			1,931	6,950		
24	Worsted mills								
25	Carpet mills (other than rag)								
26	Felt mills								
27	Wool hat mills								
28	Hosiery and knitting mills	3,246,590	9,024,221	25,072	85,401	806,150	1,035,080	342,497	1,476,430

BY CLASSES, FOR THE UNITED STATES: 1890—Continued.

PRODUCTS—continued.

Carpets—Continued.								Rugs.						
Moquette.		Smyrna.		Rag.		All other.		Wilton.		Moquette.		Ingrain.		
Running yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
3,193,186	$3,247,845	127,177	$332,718	77,410	$25,629	1,316,743	$425,857	40,644	$87,702	60,000	$66,000	6,278	$34,262	1
				6,100	2,490	3,925	2,304							2
														3
3,193,186	3,247,845	127,177	332,718	71,310	23,139	1,312,818	423,553	40,644	87,702	60,000	66,000	6,278	34,262	4
														5
														6
														7

PRODUCTS—continued.

Felt goods—Continued.														
Table and piano covers.		For ladies' hats.		Saddle felts.		Rubber shoe linings.		Endless belts.		Druggets.		Hair felting.		
Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	Square yards.	Value.	
20,000	$57,400	36,000	$18,000	45,904	$22,952	2,087,557	$576,946	216,982	$1,086,086	185,338	$91,742	551,760	$188,341	8
								15,819	15,615					9
														10
										103,238	67,118			11
20,000	57,400	36,000	18,000	45,904	22,952	2,087,557	576,946	201,163	1,070,471	82,080	24,624	551,760	188,341	12
														13
														14

PRODUCTS—continued.

Hosiery and knit goods—Continued.														
Woolen hose.		Merino or mixed half hose.		Merino or mixed hose.		Cotton half hose.		Cotton hose.		Merino or mixed shirts and drawers.		All woolen shirts and drawers.		
Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	
2,251,541	$4,744,009	376,253	$605,173	433,083	$791,227	5,341,628	$3,936,536	7,387,409	$6,214,202	2,526,226	$15,055,999	1,092,841	$8,921,777	15
8,997	21,213	200	400					150	150			4,000	40,000	16
														17
														18
														19
2,242,544	4,722,796	376,053	604,773	433,083	791,227	5,341,628	3,936,536	7,387,259	6,214,052	2,526,226	15,055,999	1,088,841	8,881,777	20

PRODUCTS—continued.

Hosiery and knit goods—Continued.										
Cardigan jackets, fancy jackets, etc.		Shawls.		Fancy knit goods, wristers, etc.		Boot and shoe linings.		Jersey cloth.		
Dozens.	Value.	Dozens.	Value.	Dozens.	Value.	Yards.	Value.	Yards.	Value.	
361,478	$3,576,248	22,990	$115,467	270,633	$759,748	7,596,711	$1,088,558	3,072,533	$2,171,328	22
				100	100			7,476	13,636	23
										24
										25
										26
										27
361,478	3,576,248	22,990	115,467	270,533	759,648	7,596,711	1,088,558	3,065,057	2,157,692	28

TABLE 4.—SUMMARY OF STATISTICS OF WOOL MANUFACTURE,

	CLASSES.	PRODUCTS—continued.									
		Partly manufactured products for sale.									
		Total.		Woolen yarn, all wool.		Woolen yarn, union or merino.		Worsted yarn.		Cotton yarn.	
		Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1	Total	88,134,330	$39,433,835	35,415,360	$10,742,882	6,799,813	$2,320,088	29,376,182	$22,411,363	3,692,936	$782,849
2	Woolen mills	48,077,114	14,304,804	30,708,571	8,990,106	6,670,757	2,253,792	2,073,546	1,306,927	3,159,047	626,072
3	Worsted mills	36,052,126	23,529,514	3,341,036	1,166,737	71,419	54,271	24,763,501	20,291,046	33,889	6,777
4	Carpet mills (other than rag)	2,616,410	953,127	443,573	104,336	57,637	12,025	1,922,135	799,748	.....	.....
5	Felt mills	10,000	9,000	10,000	9,000	.....	.....	.....	.....	.....	.....
6	Wool hat mills	9,500	1,045	.....	.....	.....	.....	.....	.....	.....	.....
7	Hosiery and knitting mills	1,369,180	636,345	852,180	472,703	.....	.....	17,000	13,642	500,000	150,000

TABLE 5.—WOOLEN MILLS, BY

	STATES AND TERRITORIES.	Number of establishments.	CAPITAL.							
			Value of hired property.	Direct investment.					Live assets.	
				Aggregate.	Value of plant.					
					Total.	Land.	Buildings.	Machinery, tools, and implements.	Total.	Raw materials.
1	The United States	1,311	$6,859,174	$130,989,940	$57,820,243	$6,534,819	$19,332,575	$31,952,849	$73,169,697	$19,494,122
2	Alabama	6	400	18,325	15,250	3,800	1,750	9,700	3,075	1,525
3	Arkansas	6	.....	27,435	21,800	1,750	6,050	14,000	5,635	1,235
4	California	8	81,870	2,618,480	1,540,103	170,300	432,705	937,098	1,078,377	183,310
5	Connecticut	55	252,166	10,188,042	4,614,627	402,050	1,802,474	2,290,103	5,573,415	1,544,877
6	Delaware	3	.....	450,974	257,000	33,500	80,000	143,500	193,974	72,170
7	Georgia	14	.....	208,539	208,440	19,222	94,525	94,693	90,099	20,317
8	Illinois	23	3,000	1,649,918	600,939	68,775	193,864	338,300	1,048,979	261,275
9	Indiana	45	42,725	2,880,114	1,305,795	83,437	336,859	915,499	1,514,319	358,302
10	Iowa	14	13,700	694,600	293,800	31,450	83,350	179,000	400,800	72,900
11	Kentucky	40	87,700	2,560,737	1,211,056	69,935	309,960	831,161	1,349,681	374,747
12	Maine	75	76,400	8,338,864	3,503,276	327,725	1,377,050	1,798,501	4,835,588	1,437,520
13	Maryland	9	.....	372,875	228,600	32,200	75,800	120,600	144,275	46,300
14	Massachusetts	165	2,289,401	34,911,187	13,053,062	1,671,678	5,217,380	6,764,004	21,257,525	5,535,310
15	Michigan	32	85,250	943,598	383,464	23,900	119,531	240,033	560,134	115,327
16	Minnesota	21	6,300	563,771	374,861	143,350	114,175	117,336	188,910	50,657
17	Mississippi	7	.....	1,553,455	876,030	64,650	201,950	609,430	677,425	150,791
18	Missouri	35	11,950	720,616	475,428	68,759	143,808	262,861	245,188	59,893
19	New Hampshire	46	42,500	7,540,233	2,882,643	330,825	938,618	1,613,200	4,657,590	1,658,994
20	New Jersey	21	228,582	3,810,832	1,987,064	355,275	602,625	969,164	1,823,768	632,288
21	New York	91	89,665	7,243,380	4,295,243	443,070	1,400,417	2,451,756	2,948,137	597,797
22	North Carolina	27	.....	339,088	184,530	30,980	44,800	108,750	154,558	36,911
23	Ohio	64	14,650	1,609,574	782,951	78,715	242,589	461,647	826,623	223,051
24	Oregon	6	.....	1,350,585	342,820	54,600	96,306	191,914	1,007,765	185,706
25	Pennsylvania	264	2,164,439	21,671,137	10,266,284	1,123,223	3,020,191	6,122,870	11,404,853	3,191,644
26	Rhode Island	40	1,253,000	9,360,927	3,476,501	288,306	944,200	2,243,995	5,884,426	1,513,534
27	Tennessee	49	2,700	1,393,679	672,013	70,545	180,210	421,258	721,666	191,065
28	Texas	4	.....	371,270	256,130	62,005	44,050	150,075	115,140	28,740
29	Utah	9	22,250	579,209	282,125	31,625	83,500	167,000	297,084	60,784
30	Vermont	29	16,500	3,304,382	1,268,110	158,285	505,625	604,200	2,036,272	474,356
31	Virginia	35	38,000	845,221	421,737	65,319	127,475	228,943	423,484	97,132
32	West Virginia	30	2,800	336,281	167,270	15,295	54,400	97,575	169,011	48,708
33	Wisconsin	32	20,725	2,333,700	850,491	137,080	291,838	421,573	1,483,209	249,496
34	All other states (*b*)	6	3,500	108,912	60,200	13,100	14,500	32,600	48,712	11,460

a Includes officers, firm members, and clerks. For detailed information see Table 12.

BY CLASSES, FOR THE UNITED STATES: 1890—Continued.

PRODUCTS—continued.												
Partly manufactured products for sale—Continued.												
Woolen card rolls.		Worsted slubbing and tops.		Worsted noils.		Waste.		Shoddy and mungo.		Wool extract.		All other products.
Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Value.	
1,435,215	$704,581	391,501	$106,516	4,466,021	$1,462,050	4,334,436	$691,402	1,586,300	$179,851	635,966	$92,253	$6,457,933	1
1,435,215	704,581	31,400	18,840	45,000	13,000	1,085,178	180,425	1,583,300	179,351	625,100	31,710	1,639,470	2
.....	.....	360,101	87,676	4,337,621	1,433,050	3,130,693	488,914	3,000	500	10,866	543	276,291	3
.....	.....	.....	.....	84,000	16,000	109,065	21,018	.....	.....	.....	.....	62,000	4
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,094,231	5
.....	.....	.....	.....	.....	.....	9,500	1,045	.....	.....	.....	.....	100,000	6
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,285,941	7

STATES AND TERRITORIES: 1890.

CAPITAL—continued.		MISCELLANEOUS EXPENSES.							AVERAGE NUMBER OF EMPLOYÉS AND TOTAL WAGES. (a)		
Direct investment—Continued.											
Live assets—Continued.											
Stock in process and finished products on hand.	Cash, bills and accounts receivable, and all sundries not elsewhere reported.	Total.	Rent paid for tenancy.	Taxes.	Insurance.	Repairs, ordinary, of buildings and machinery.	Interest paid on cash used in the business.	Sundries not elsewhere reported.	Employés.	Wages.	
$20,489,237	$24,186,338	$8,402,623	$541,807	$530,236	$647,602	$1,390,810	$2,865,941	$2,426,227	79,351	$28,478,931	1
600	950	419	24	195	120	80	.....	.....	16	3,125	2
2,000	2,400	752	.....	112	25	225	90	300	31	6,231	3
545,934	349,133	168,324	5,606	8,080	19,657	11,617	102,249	21,019	1,264	287,658	4
2,407,033	1,621,505	614,501	14,059	37,071	45,520	90,140	244,442	183,329	5,173	2,035,462	5
86,156	35,648	27,404	.....	887	2,142	8,251	1,705	14,419	297	103,395	6
47,671	22,111	10,887	.....	1,627	16	3,309	5,132	803	179	32,401	7
379,572	408,132	110,159	240	6,943	10,134	19,312	31,300	42,170	914	313,780	8
643,614	512,403	232,105	2,823	13,040	25,201	50,774	76,135	63,732	2,103	600,062	9
220,850	107,050	40,050	1,100	4,761	3,346	8,308	12,021	10,424	378	133,240	10
400,397	574,537	176,755	8,300	9,979	17,353	31,667	46,472	62,984	1,803	554,544	11
2,474,190	923,878	472,848	5,968	31,075	44,397	83,585	221,907	85,316	4,323	1,629,888	12
81,825	16,150	14,442	.....	2,542	1,392	3,434	3,945	3,129	383	123,931	13
8,421,466	7,300,749	2,618,078	176,810	202,245	161,666	397,922	1,006,373	673,062	19,813	7,586,575	14
155,603	289,204	42,713	4,414	3,527	4,148	6,494	17,500	6,630	518	156,128	15
115,000	22,353	46,211	355	3,404	4,721	8,905	13,281	15,545	341	120,967	16
337,667	182,967	18,054	.....	7,978	5,111	635	2,160	2,170	1,082	306,270	17
114,865	70,430	29,775	666	2,553	4,638	8,118	11,523	2,277	510	122,410	18
1,979,232	1,019,364	483,598	3,235	38,803	32,410	92,725	147,803	165,622	4,189	1,643,168	19
606,121	585,359	405,715	14,974	16,711	19,438	66,629	99,349	188,614	4,228	1,481,815	20
1,025,058	1,325,282	356,245	7,871	15,555	27,514	65,665	60,899	175,750	2,969	1,046,778	21
62,127	55,520	14,758	.....	1,394	976	1,220	915	10,253	324	65,329	22
307,779	295,793	100,326	1,165	8,987	11,824	20,739	31,984	25,627	1,032	294,365	23
383,620	438,430	86,906	.....	2,795	13,877	7,804	33,984	28,446	402	175,319	24
4,229,617	3,983,592	1,356,208	182,228	49,593	108,810	241,588	336,640	437,349	16,061	5,729,982	25
2,554,613	1,816,279	530,535	102,374	20,914	37,498	87,419	190,609	91,721	6,028	2,297,416	26
221,909	308,692	56,263	165	6,953	7,124	12,499	18,719	10,803	908	239,657	27
58,400	28,000	17,333	.....	929	2,104	2,100	4,150	8,050	359	138,795	28
146,438	89,862	27,155	2,550	3,965	4,180	8,275	8,100	85	274	104,156	29
690,274	871,642	178,385	1,040	9,510	11,551	29,045	69,968	57,271	1,585	625,440	30
131,075	195,277	43,972	3,170	2,485	5,513	4,601	18,443	9,760	444	117,023	31
83,285	37,018	15,418	300	1,573	1,529	4,899	5,703	1,414	287	61,919	32
543,485	690,228	104,226	2,440	11,886	13,259	12,116	40,372	24,153	982	324,772	33
30,852	6,400	5,043	340	658	408	620	2,017	1,000	61	17,436	34

b Includes states having less than 3 establishments in order that the operations of individual establishments may not be disclosed. These establishments are distributed as follows: Idaho, 1; Kansas, 1; Louisiana, 1; South Carolina, 1; South Dakota, 2.

TABLE 5.—WOOLEN MILLS, BY STATES

	STATES AND TERRITORIES.	MACHINERY.								
		Cards. (Sets.)	Combing machines.		Spindles.			Looms on woolen and worsted goods.		
			Foreign.	American.	Woolen.	Worsted.	Cotton.	Broad looms on woolen goods.	Broad looms on worsted goods.	Narrow looms on woolen goods.
1	The United States	5,243	39	9	1,742,288	19,750	53,342	19,028	1,037	17,289
2	Alabama	6			160		128			12
3	Arkansas	7			735			3		21
4	California	70			18,598			285		7
5	Connecticut	351			124,478			1,540	120	586
6	Delaware	15			7,306			40		189
7	Georgia	20			3,552					119
8	Illinois	57			18,745			185		138
9	Indiana	127		4	40,690		6,000	218	1	786
10	Iowa	36			10,828			103		55
11	Kentucky	97			36,346			15	1	1,606
12	Maine	361			118,138		7,000	1,736	35	40
13	Maryland	30			8,294		2,856	49		61
14	Massachusetts	1,405			484,228		2,008	6,256	54	2,395
15	Michigan	51			13,559			77		80
16	Minnesota	37			7,510			99		26
17	Mississippi	31			9,196			338		38
18	Missouri	52			12,964		20	74		187
19	New Hampshire	343			111,728	120		1,623	80	251
20	New Jersey	144	5		51,697	4,880		714	241	177
21	New York	271			73,019		3,740	762	37	466
22	North Carolina	35			4,682		6,308	12		139
23	Ohio	96		1	26,417		20	187		269
24	Oregon	21			6,052			84		10
25	Pennsylvania	805	18		325,327	1,730	21,524	2,545	397	7,599
26	Rhode Island	311	16	1	114,782	11,232	2,888	1,120	58	626
27	Tennessee	80			19,138		800	14		792
28	Texas	9			1,900			28		107
29	Utah	31			7,960			56		43
30	Vermont	120			41,839			495		187
31	Virginia	54			12,382			125		85
32	West Virginia	41			7,164			42		111
33	Wisconsin	62		3	21,346	1,788		183	13	62
34	All other states	7			1,528		50	14		19